File S1

Complete calculation process of Numerical Simulation: Please note that in the calculation, c corresponds to σ_x, d corresponds to σ_y, a corresponds to α, b corresponds to β, p corresponds to p_A^{MM}, i corresponds to p_B^{MM}, r corresponds to r_A^{MM}, e corresponds to r_B^{MM}, x corresponds to $\hat{x}_A^{MM}$, m corresponds to $\hat{x}_B^{MM}$, y corresponds to $\hat{y}_A^{MM}$, and n corresponds to $\hat{y}_B^{MM}$, π corresponds to the platform A's optimal profit.

```
> eqns:={x=(c+a*(w*y+(1-w)*n)-p)/z,m=1-(c+a*(Y+(w-1)*y-w*n)-i)/z,y=(d+b*(w*
  x+(1-w)*m)-r)/q,n=Y-(d+b*(1+(w-1)*x-w*m)-e)/q};
```

$$eqns := \left\{ m = 1 - \frac{c + a\ (Y + (w-1)\ y - w\ n) - i}{z},\ n = Y \right. \tag{1}$$
$$- \frac{d + b\ (1 + (w-1)\ x - w\ m) - e}{q},\ x = \frac{c + a\ (w\ y + (1-w)\ n) - p}{z},\ y$$
$$\left. = \frac{d + b\ (w\ x + (1-w)\ m) - r}{q} \right\}$$

```
> vars:={x,y,m,n};
```

$$vars := \{m,\ n,\ x,\ y\} \tag{2}$$

```
> solve(eqns,{x,y,m,n})
```

$$\left\{ m = -(Y\ a^2\ b\ q\ w - Y\ a\ q^2\ w\ z - 2\ a^2\ b^2\ w^2 + 2\ a^2\ b\ e\ w^2 - 2\ a^2\ b\ r\ w^2 \right. \tag{3}$$
$$+ 2\ a\ b\ i\ q\ w^2 - 2\ a\ b\ p\ q\ w^2 + 2\ a\ b\ q\ w^2\ z - Y\ a^2\ b\ q + Y\ a\ q^2\ z + a^2\ b^2\ w$$
$$- 2\ a^2\ b\ d\ w - a^2\ b\ e\ w + 3\ a^2\ b\ r\ w - 2\ a\ b\ i\ q\ w + 2\ a\ b\ p\ q\ w - a\ b\ q\ w\ z$$
$$+ 2\ a\ d\ q\ w\ z - a\ e\ q\ w\ z - a\ q\ r\ w\ z + a^2\ b\ d - a^2\ b\ r - a\ b\ c\ q + a\ b\ i\ q$$
$$+ a\ b\ q\ z - a\ d\ q\ z + a\ q\ r\ z + c\ q^2\ z - i\ q^2\ z - q^2\ z^2) / (4\ a^2\ b^2\ w^2$$
$$- 4\ a\ b\ q\ w^2\ z - 4\ a^2\ b^2\ w + 4\ a\ b\ q\ w\ z + a^2\ b^2 - 2\ a\ b\ q\ z + q^2\ z^2),\ n$$
$$= (2\ Y\ a^2\ b^2\ w^2 - 2\ Y\ a\ b\ q\ w^2\ z - Y\ a^2\ b^2\ w + Y\ a\ b\ q\ w\ z - 2\ a\ b^2\ i\ w^2$$
$$+ 2\ a\ b^2\ p\ w^2 - 2\ a\ b\ e\ w^2\ z + 2\ a\ b\ r\ w^2\ z - Y\ a\ b\ q\ z + Y\ q^2\ z^2 + 2\ a\ b^2\ c\ w$$
$$+ a\ b^2\ i\ w - 3\ a\ b^2\ p\ w - a\ b^2\ w\ z + 2\ a\ b\ e\ w\ z - 2\ a\ b\ r\ w\ z - 2\ b\ c\ q\ w\ z$$
$$+ b\ i\ q\ w\ z + b\ p\ q\ w\ z + b\ q\ w\ z^2 - a\ b^2\ c + a\ b^2\ p + a\ b^2\ z + a\ b\ d\ z$$
$$- a\ b\ e\ z + b\ c\ q\ z - b\ p\ q\ z - b\ q\ z^2 - d\ q\ z^2 + e\ q\ z^2) / (4\ a^2\ b^2\ w^2$$
$$- 4\ a\ b\ q\ w^2\ z - 4\ a^2\ b^2\ w + 4\ a\ b\ q\ w\ z + a^2\ b^2 - 2\ a\ b\ q\ z + q^2\ z^2),\ x$$
$$= (Y\ a^2\ b\ q\ w - Y\ a\ q^2\ w\ z + 2\ a^2\ b^2\ w^2 - 2\ a^2\ b\ e\ w^2 + 2\ a^2\ b\ r\ w^2 - 2\ a\ b\ i\ q\ w^2$$

$$+2\,a\,b\,p\,q\,w^2-2\,a\,b\,q\,w^2\,z-Y\,a^2\,b\,q+Y\,a\,q^2\,z-3\,a^2\,b^2\,w-2\,a^2\,b\,d\,w$$

$$+3\,a^2\,b\,\mathbf{e}\,w-a^2\,b\,r\,w+2\,a\,b\,i\,q\,w-2\,a\,b\,p\,q\,w+3\,a\,b\,q\,w\,z$$

$$+2\,a\,d\,q\,w\,z-a\,\mathbf{e}\,q\,w\,z-a\,q\,r\,w\,z+a^2\,b^2+a^2\,b\,d-a^2\,b\,\mathbf{e}-a\,b\,c\,q$$

$$+a\,b\,p\,q-a\,b\,q\,z-a\,d\,q\,z+a\,\mathbf{e}\,q\,z+c\,q^2\,z-p\,q^2\,z)\Big/(4\,a^2\,b^2\,w^2$$

$$-4\,a\,b\,q\,w^2\,z-4\,a^2\,b^2\,w+4\,a\,b\,q\,w\,z+a^2\,b^2-2\,a\,b\,q\,z+q^2\,z^2),\ y$$

$$=(2\,Y\,a^2\,b^2\,w^2-2\,Y\,a\,b\,q\,w^2\,z-3\,Y\,a^2\,b^2\,w+3\,Y\,a\,b\,q\,w\,z-2\,a\,b^2\,i\,w^2$$
$$+2\,a\,b^2\,p\,w^2-2\,a\,b\,\mathbf{e}\,w^2\,z+2\,a\,b\,r\,w^2\,z+Y\,a^2\,b^2-Y\,a\,b\,q\,z-2\,a\,b^2\,c\,w$$
$$+3\,a\,b^2\,i\,w-a\,b^2\,p\,w+a\,b^2\,w\,z+2\,a\,b\,\mathbf{e}\,w\,z-2\,a\,b\,r\,w\,z+2\,b\,c\,q\,w\,z$$
$$-b\,i\,q\,w\,z-b\,p\,q\,w\,z-b\,q\,w\,z^2+a\,b^2\,c-a\,b^2\,i-a\,b^2\,z-a\,b\,d\,z$$
$$+a\,b\,r\,z-b\,c\,q\,z+b\,i\,q\,z+b\,q\,z^2+d\,q\,z^2-q\,r\,z^2)\Big/(4\,a^2\,b^2\,w^2$$
$$-4\,a\,b\,q\,w^2\,z-4\,a^2\,b^2\,w+4\,a\,b\,q\,w\,z+a^2\,b^2-2\,a\,b\,q\,z+q^2\,z^2)\}$$

```
> map( simplify,(3) );
```

$$\left\{m=\frac{1}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)}\left(\left((-2\,w^2+w)\,b+Y\,(w-1)\,q-2\left(w\right.\right.\right.\right. \tag{4}$$

$$\left.\left.\left.\left.-\frac{1}{2}\right)((r-\mathbf{e})\,w-r+d)\right)b\,a^2-(((-2\,z-2\,i+2\,p)\,w^2+(z+2\,i-2\,p)\,w\right.$$

$$\left.-z+c-i)\,b+z\,(Y\,(w-1)\,q+(r-2\,d+\mathbf{e})\,w-r+d))\,q\,a-z\,q^2\,(z-c\right.$$

$$\left.+i)),\ n=\frac{1}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)}\left(-2\left(Y\,w\left(w-\frac{1}{2}\right)a\right.\right.\right.$$

$$\left.\left.\left.+\frac{(1-w)\,z}{2}-\left(w-\frac{1}{2}\right)((i-p)\,w-c+p)\right)a\,b^2+2\,z\left(\left((Y\,q+\mathbf{e}-r)\,w^2\right.\right.\right.\right.$$

$$+\left(-\frac{Y\,q}{2}+r-\boldsymbol{e}\right)\,w+\frac{Y\,q}{2}-\frac{d}{2}+\frac{\boldsymbol{e}}{2}\Bigg)\,a$$

$$-\frac{((w-1)\,z+(-2\,c+i+p)\,w+c-p)\,q}{2}\Bigg)\,b-z^2\,q\,(Y\,q-d+\boldsymbol{e})\Bigg),\,x$$

$$=\frac{1}{4\left(\left(w-\frac{1}{2}\right)^2\,b\,a-\frac{z\,q}{4}\right)\,(-a\,b+z\,q)}\Bigg(-b\,\Bigg((2\,w^2-3\,w+1)\,b+Y\,(w$$

$$-1)\,q+2\left(w-\frac{1}{2}\right)\,((r-\boldsymbol{e})\,w-d+\boldsymbol{e})\Bigg)\,a^2+q\,(((2\,z+2\,i-2\,p)\,w^2+($$

$$-3\,z-2\,i+2\,p)\,w+z+c-p)\,b+z\,(Y\,(w-1)\,q+(r-2\,d+\boldsymbol{e})\,w+d$$

$$-\boldsymbol{e}))\,a-z\,q^2\,(c-p)),\,y=\frac{1}{4\left(\left(w-\frac{1}{2}\right)^2\,b\,a-\frac{z\,q}{4}\right)\,(-a\,b+z\,q)}\Bigg($$

$$-2\left(Y\left(w-\frac{1}{2}\right)\,(w-1)\,a+\frac{(w-1)\,z}{2}-\left(w-\frac{1}{2}\right)\,((i-p)\,w+c-i)\right)\,a\,b^2$$

$$+2\,z\left(\left((Y\,q+\boldsymbol{e}-r)\,w^2+\left(-\frac{3\,Y\,q}{2}+r-\boldsymbol{e}\right)\,w+\frac{Y\,q}{2}-\frac{r}{2}+\frac{d}{2}\right)\,a\right.$$

$$\left.+\frac{q\,((w-1)\,z+(-2\,c+i+p)\,w+c-i)}{2}\right)\,b+z^2\,q\,(r-d)\Bigg)\Bigg\}$$

```
> diff(p*((-b*((2*w^2 - 3*w + 1)*b + Y*(w - 1)*q + 2*(w - 1/2)*((r - e)*w - d
  + e))*a^2 + q*(((2*z + 2*i - 2*p)*w^2 + (-3*z - 2*i + 2*p)*w + z + c - p)*b
  + z*(Y*(w - 1)*q + (r - 2*d + e)*w + d - e))*a - z*q^2*(c - p))/(4*((w -
  1/2)^2*b*a - z*q/4)*(-a*b + q*z)))+r*((-2*(Y*(w - 1/2)*(w - 1)*a + ((w - 1)
  *z)/2 - (w - 1/2)*((i - p)*w + c - i))*a*b^2 + 2*z*(((Y*q + e - r)*w^2 + (-
  (3*Y*q)/2 + r - e)*w + Y*q/2 - r/2 + d/2)*a + q*((w - 1)*z + (-2*c + i + p)
  *w + c - i)/2)*b + z^2*q*(r - d))/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z)
  )),p);
```

$$\frac{1}{4\left(\left(w-\frac{1}{2}\right)^2\,b\,a-\frac{z\,q}{4}\right)\,(-a\,b+z\,q)}\Bigg(-b\,\Bigg((2\,w^2-3\,w+1)\,b+Y\,(w-1)\,q \qquad \textbf{(5)}$$

$$+2\left(w-\frac{1}{2}\right)\,((r-\boldsymbol{e})\,w-d+\boldsymbol{e})\Bigg)\,a^2+q\,(((2\,z+2\,i-2\,p)\,w^2+(-3\,z-2\,i$$

$$+2\ p)\ w+z+c-p)\ b+z\ (Y\ (w-1)\ q+(r-2\ d+e)\ w+d-e))\ a$$

$$-z\ q^2\ (c-p)\Big)+\frac{p\ (q\ (-2\ w^2+2\ w-1)\ b\ a+z\ q^2)}{4\ \left(\left(w-\frac{1}{2}\right)^2\ b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}$$

$$+\frac{r\ \left(-2\ \left(w-\frac{1}{2}\right)\ w\ a\ b^2+z\ q\ w\ b\right)}{4\ \left(\left(w-\frac{1}{2}\right)^2\ b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}$$

```
> diff(p*((-b*((2*w^2 - 3*w + 1)*b + Y*(w - 1)*q + 2*(w - 1/2)*((r - e)*w - d
  + e))*a^2 + q*(((2*z + 2*i - 2*p)*w^2 + (-3*z - 2*i + 2*p)*w + z + c - p)*b
  + z*(Y*(w - 1)*q + (r - 2*d + e)*w + d - e))*a - z*q^2*(c - p))/(4*((w -
  1/2)^2*b*a - z*q/4)*(-a*b + q*z)))+r*((-2*(Y*(w - 1/2)*(w - 1)*a + ((w - 1)
  *z)/2 - (w - 1/2)*((i - p)*w + c - i))*a*b^2 + 2*z*(((Y*q + e - r)*w^2 + (-
  (3*Y*q)/2 + r - e)*w + Y*q/2 - r/2 + d/2)*a + q*((w - 1)*z + (-2*c + i + p)
  *w + c - i)/2)*b + z^2*q*(r - d))/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z)
  )),r);
```

$$\frac{p\ \left(-2\ b\ \left(w-\frac{1}{2}\right)\ w\ a^2+q\ w\ z\ a\right)}{4\ \left(\left(w-\frac{1}{2}\right)^2\ b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)} \tag{6}$$

$$+\frac{1}{4\ \left(\left(w-\frac{1}{2}\right)^2\ b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}\Big(-2\ \Big(Y\ \left(w-\frac{1}{2}\right)\ (w-1)\ a$$

$$+\frac{(w-1)\ z}{2}-\left(w-\frac{1}{2}\right)\ ((i-p)\ w+c-i)\Big)\ a\ b^2+2\ z\ \Big(\Big((Y\ q+e-r)\ w^2+\Big($$

$$-\frac{3\ Y\ q}{2}+r-e\Big)\ w+\frac{Y\ q}{2}-\frac{r}{2}+\frac{d}{2}\Big)\ a$$

$$+\frac{q\ ((w-1)\ z+(-2\ c+i+p)\ w+c-i)}{2}\Big)\ b+z^2\ q\ (r-d)\Big)$$

$$+\frac{r\ \left(2\ z\ \left(-w^2+w-\frac{1}{2}\right)\ a\ b+z^2\ q\right)}{4\ \left(\left(w-\frac{1}{2}\right)^2\ b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}$$

```
> diff(i*(1-(((-2*w^2 + w)*b + Y*(w - 1)*q - 2*(w - 1/2)*((r - e)*w - r + d))
  *b*a^2 - (((-2*z - 2*i + 2*p)*w^2 + (z + 2*i - 2*p)*w - z + c - i)*b + z*
  (Y*(w - 1)*q + (r - 2*d + e)*w - r + d))*q*a - z*q^2*(z - c + i))/(4*((w -
  1/2)^2*b*a - z*q/4)*(-a*b + q*z)))+e*(Y-((-2*(Y*w*(w - 1/2)*a + ((1 - w)*z)
  /2 - (w - 1/2)*((i - p)*w - c + p))*a*b^2 + 2*z*(((Y*q + e - r)*w^2 + (-Y*
  q/2 + r - e)*w + Y*q/2 - d/2 + e/2)*a - (((w - 1)*z + (-2*c + i + p)*w + c -
  p)*q)/2)*b - z^2*q*(Y*q - d + e))/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z)
  ))),i);
```

(7)

$$1-\frac{1}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)}\left(\left((-2\,w^2+w)\,b+Y\,(w-1)\,q-2\left(w-\frac{1}{2}\right)((r-\mathbf{e})\,w-r+d)\right)b\,a^2-(((-2\,z-2\,i+2\,p)\,w^2+(z+2\,i-2\,p)\,w-z+c-i)\,b+z\,(Y\,(w-1)\,q+(r-2\,d+\mathbf{e})\,w-r+d))\,q\,a-z\,q^2\,(z-c+i)\right)-\frac{i\,(-q\,(-2\,w^2+2\,w-1)\,b\,a-z\,q^2)}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)}-\frac{\mathbf{e}\left(2\left(w-\frac{1}{2}\right)w\,a\,b^2-z\,q\,w\,b\right)}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)} \tag{7}$$

```
> diff(i*(1-(((-2*w^2 + w)*b + Y*(w - 1)*q - 2*(w - 1/2)*((r - e)*w - r + d))
  *b*a^2 - (((-2*z - 2*i + 2*p)*w^2 + (z + 2*i - 2*p)*w - z + c - i)*b + z*
  (Y*(w - 1)*q + (r - 2*d + e)*w - r + d))*q*a - z*q^2*(z - c + i))/(4*((w -
  1/2)^2*b*a - z*q/4)*(-a*b + q*z)))+e*(Y-((-2*(Y*w*(w - 1/2)*a + ((1 - w)*z)
  /2 - (w - 1/2)*((i - p)*w - c + p))*a*b^2 + 2*z*(((Y*q + e - r)*w^2 + (-Y*
  q/2 + r - e)*w + Y*q/2 - d/2 + e/2)*a - (((w - 1)*z + (-2*c + i + p)*w + c -
  p)*q)/2)*b - z^2*q*(Y*q - d + e))/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z)
  ))),e);
```

$$-\frac{i\left(2\,b\left(w-\frac{1}{2}\right)w\,a^2-q\,w\,z\,a\right)}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)}+Y-\frac{1}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)}\left(-2\left(Y\,w\left(w-\frac{1}{2}\right)a+\frac{(1-w)\,z}{2}-\left(w-\frac{1}{2}\right)((i-p)\,w-c+p)\right)a\,b^2+2\,z\left(\left((Y\,q+\mathbf{e}-r)\,w^2+\left(-\frac{Y\,q}{2}+r-\mathbf{e}\right)w+\frac{Y\,q}{2}-\frac{d}{2}+\frac{\mathbf{e}}{2}\right)a-\frac{((w-1)\,z+(-2\,c+i+p)\,w+c-p)\,q}{2}\right)b-z^2\,q\,(Y\,q-d+\mathbf{e})\right)-\frac{\mathbf{e}\left(2\,z\left(w^2-w+\frac{1}{2}\right)a\,b-z^2\,q\right)}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)} \tag{8}$$

```
> eqns:={(-b*((2*w^2 - 3*w + 1)*b + Y*(w - 1)*q + 2*(w - 1/2)*((r - e)*w - d
  + e))*a^2 + q*(((2*z + 2*i - 2*p)*w^2 + (-3*z - 2*i + 2*p)*w + z + c - p)*b
  + z*(Y*(w - 1)*q + (r - 2*d + e)*w + d - e))*a - z*q^2*(c - p))/(4*((w -
  1/2)^2*b*a - z*q/4)*(-a*b + q*z)) + p*(q*(-2*w^2 + 2*w - 1)*b*a + z*q^2)/
  (4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z)) + r*(-2*(w - 1/2)*w*a*b^2 + z*q*
  w*b)/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z))=0,p*(-2*b*(w - 1/2)*w*a^2 +
```

```
q*w*z*a)/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z)) + (-2*(Y*(w - 1/2)*(w -
1)*a + ((w - 1)*z)/2 - (w - 1/2)*((i - p)*w + c - i))*a*b^2 + 2*z*(((Y*q +
e - r)*w^2 + (-(3*Y*q)/2 + r - e)*w + Y*q/2 - r/2 + d/2)*a + q*((w - 1)*z +
(-2*c + i + p)*w + c - i)/2)*b + z^2*q*(r - d))/(4*((w - 1/2)^2*b*a - z*
q/4)*(-a*b + q*z)) + r*(2*z*(-w^2 + w - 1/2)*a*b + z^2*q)/(4*((w - 1/2)^2*
b*a - z*q/4)*(-a*b + q*z))=0,1 - (((-2*w^2 + w)*b + Y*(w - 1)*q - 2*(w -
1/2)*((r - e)*w - r + d))*b*a^2 - (((-2*z - 2*i + 2*p)*w^2 + (z + 2*i - 2*
p)*w - z + c - i)*b + z*(Y*(w - 1)*q + (r - 2*d + e)*w - r + d))*q*a - z*
q^2*(z - c + i))/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z)) - i*(-q*(-2*w^2
+ 2*w - 1)*b*a - z*q^2)/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z)) - e*(2*
(w - 1/2)*w*a*b^2 - z*q*w*b)/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z))=0,-
i*(2*b*(w - 1/2)*w*a^2 - q*w*z*a)/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z)
) + Y - (-2*(Y*w*(w - 1/2)*a + ((1 - w)*z)/2 - (w - 1/2)*((i - p)*w - c +
p))*a*b^2 + 2*z*(((Y*q + e - r)*w^2 + (-Y*q/2 + r - e)*w + Y*q/2 - d/2 +
e/2)*a - (((w - 1)*z + (-2*c + i + p)*w + c - p)*q)/2)*b - z^2*q*(Y*q - d +
e))/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z)) - e*(2*z*(w^2 - w + 1/2)*a*b
- z^2*q)/(4*((w - 1/2)^2*b*a - z*q/4)*(-a*b + q*z))=0};
```

$$eqns := \left\{ \frac{1}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)}\left(-b\left(\left(2\,w^2-3\,w+1\right)b+Y\,(w\right.\right.\right. \tag{9}$$

$$-1)\,q+2\left(w-\frac{1}{2}\right)((r-e)\,w-d+e)\Big)\,a^2+q\,(((2\,z+2\,i-2\,p)\,w^2+($$

$$-3\,z-2\,i+2\,p)\,w+z+c-p)\,b+z\,(Y\,(w-1)\,q+(r-2\,d+e)\,w+d$$

$$-e))\,a-z\,q^2\,(c-p))+\frac{p\,(q\,(-2\,w^2+2\,w-1)\,b\,a+z\,q^2)}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)}$$

$$+\frac{r\left(-2\left(w-\frac{1}{2}\right)w\,a\,b^2+z\,q\,w\,b\right)}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)}=0,$$

$$\frac{p\left(-2\,b\left(w-\frac{1}{2}\right)w\,a^2+q\,w\,z\,a\right)}{4\left(\left(w-\frac{1}{2}\right)^2 b\,a-\frac{z\,q}{4}\right)(-a\,b+z\,q)}$$

$$+\frac{1}{4\left(\left(w-\frac{1}{2}\right)^2 b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}\left(-2\ \left(Y\ \left(w-\frac{1}{2}\right)\ (w-1)\ a\right.\right.$$

$$\left.+\frac{(w-1)\ z}{2}-\left(w-\frac{1}{2}\right)\ ((i-p)\ w+c-i)\right)\ a\ b^2+2\ z\ \left(\left((Y\ q+\mathbf{e}-r)\ w^2+\right.\right.$$

$$\left.\left.-\frac{3\ Y\ q}{2}+r-\mathbf{e}\right)\ w+\frac{Y\ q}{2}-\frac{r}{2}+\frac{d}{2}\right)\ a$$

$$\left.+\frac{q\ ((w-1)\ z+(-2\ c+i+p)\ w+c-i)}{2}\right)\ b+z^2\ q\ (r-d)\Bigg)$$

$$+\frac{r\ \left(2\ z\ \left(-w^2+w-\frac{1}{2}\right)\ a\ b+z^2\ q\right)}{4\left(\left(w-\frac{1}{2}\right)^2 b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}=0,\ 1$$

$$-\frac{1}{4\left(\left(w-\frac{1}{2}\right)^2 b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}\left(\left(\left(-2\ w^2+w\right)\ b+Y\ (w-1)\ q\right.\right.$$

$$\left.-2\ \left(w-\frac{1}{2}\right)\ ((r-\mathbf{e})\ w-r+d)\right)\ b\ a^2-(((-2\ z-2\ i+2\ p)\ w^2+(z+2\ i$$

$$-2\ p)\ w-z+c-i)\ b+z\ (Y\ (w-1)\ q+(r-2\ d+\mathbf{e})\ w-r+d))\ q\ a$$

$$\left.-z\ q^2\ (z-c+i)\right)-\frac{i\ \left(-q\ \left(-2\ w^2+2\ w-1\right)\ b\ a-z\ q^2\right)}{4\left(\left(w-\frac{1}{2}\right)^2 b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}$$

$$-\frac{\mathbf{e}\ \left(2\ \left(w-\frac{1}{2}\right)\ w\ a\ b^2-z\ q\ w\ b\right)}{4\left(\left(w-\frac{1}{2}\right)^2 b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}=0,$$

$$-\frac{i\left(2\ b\left(w-\frac{1}{2}\right)\ w\ a^2-q\ w\ z\ a\right)}{4\left(\left(w-\frac{1}{2}\right)^2\ b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}+Y$$

$$-\frac{1}{4\left(\left(w-\frac{1}{2}\right)^2\ b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}\left(-2\ \left(Y\ w\ \left(w-\frac{1}{2}\right)\ a+\frac{(1-w)\ z}{2}\right.\right.$$

$$\left.-\left(w-\frac{1}{2}\right)\ ((i-p)\ w-c+p)\right)\ a\ b^2+2\ z\ \left(\left((Y\ q+\mathbf{e}-r)\ w^2+\left(-\frac{Y\ q}{2}+r\right.\right.\right.$$

$$\left.\left.\left.-\mathbf{e}\right)\ w+\frac{Y\ q}{2}-\frac{d}{2}+\frac{\mathbf{e}}{2}\right)\ a-\frac{((w-1)\ z+(-2\ c+i+p)\ w+c-p)\ q}{2}\right)\ b$$

$$\left.-z^2\ q\ (Y\ q-d+\mathbf{e})\right)-\frac{\mathbf{e}\left(2\ z\left(w^2-w+\frac{1}{2}\right)\ a\ b-z^2\ q\right)}{4\left(\left(w-\frac{1}{2}\right)^2\ b\ a-\frac{z\ q}{4}\right)\ (-a\ b+z\ q)}=0\Bigg\}$$

```
> vars:={p,r,i,e};
```

$$vars := \{\mathbf{e},\ i,\ p,\ r\} \tag{10}$$

```
> solve(eqns,{p,r,i,e});
```

$$\Big\{\mathbf{e}=-(-4\ Y\ a^2\ b^2\ q\ w^4+2\ Y\ a^3\ b\ q\ w^3+10\ Y\ a^2\ b^2\ q\ w^3+4\ a^3\ b^2\ w^4 \tag{11}$$

$$-3\ Y\ a^3\ b\ q\ w^2-10\ Y\ a^2\ b^2\ q\ w^2-Y\ a^2\ q^2\ w^2\ z+2\ Y\ a\ b\ q^2\ w^2\ z-8\ a^3\ b^2\ w^3$$

$$-4\ a^3\ b\ d\ w^3+4\ a^2\ b^3\ w^3-2\ a^2\ b\ q\ w^3\ z+4\ a\ b^2\ c\ q\ w^3-6\ a\ b^2\ q\ w^3\ z$$

$$+Y\ a^3\ b\ q\ w+5\ Y\ a^2\ b^2\ q\ w+Y\ a^2\ q^2\ w\ z-3\ Y\ a\ b\ q^2\ w\ z+5\ a^3\ b^2\ w^2$$

$$+4\ a^3\ b\ d\ w^2-8\ a^2\ b^3\ w^2-4\ a^2\ b^2\ d\ w^2-2\ a^2\ b\ c\ q\ w^2+3\ a^2\ b\ q\ w^2\ z$$

$$+2\ a^2\ d\ q\ w^2\ z-6\ a\ b^2\ c\ q\ w^2+12\ a\ b^2\ q\ w^2\ z+6\ a\ b\ d\ q\ w^2\ z-Y\ a^2\ b^2\ q$$

$$+Y\ a\ b\ q^2\ z-a^3\ b^2\ w-a^3\ b\ d\ w+5\ a^2\ b^3\ w+4\ a^2\ b^2\ d\ w+a^2\ b\ c\ q\ w$$

$$-a^2\ b\ q\ w\ z-a^2\ d\ q\ w\ z+4\ a\ b^2\ c\ q\ w-9\ a\ b^2\ q\ w\ z-6\ a\ b\ d\ q\ w\ z$$

$$+a\ c\ q^2\ w\ z-2\ b\ c\ q^2\ w\ z+2\ b\ q^2\ w\ z^2-a^2\ b^3-a^2\ b^2\ d-a\ b^2\ c\ q$$

$$+3\ a\ b^2\ q\ z+3\ a\ b\ d\ q\ z+b\ c\ q^2\ z-2\ b\ q^2\ z^2-2\ d\ q^2\ z^2)\Big/(4\ a^2\ b^2\ w^4$$

$$+4\ a^3\ b\ w^3-4\ a^2\ b^2\ w^3+4\ a\ b^3\ w^3-4\ a^3\ b\ w^2+5\ a^2\ b^2\ w^2-2\ a^2\ q\ w^2\ z$$

$$-4\ a\ b^3\ w^2-13\ a\ b\ q\ w^2\ z-2\ b^2\ q\ w^2\ z+a^3\ b\ w-4\ a^2\ b^2\ w+a^2\ q\ w\ z$$

$$+a\ b^3\ w+12\ a\ b\ q\ w\ z+b^2\ q\ w\ z+a^2\ b^2-5\ a\ b\ q\ z+4\ z^2\ q^2),\ i=$$

$$-(4\ Y\ a^2\ b^3\ w^4+4\ Y\ a^3\ b^2\ w^3-8\ Y\ a^2\ b^3\ w^3-6\ Y\ a^2\ b\ q\ w^3\ z-2\ Y\ a\ b^2\ q\ w^3\ z$$

$$-4\ a^2\ b^2\ w^4\ z-8\ Y\ a^3\ b^2\ w^2+5\ Y\ a^2\ b^3\ w^2+12\ Y\ a^2\ b\ q\ w^2\ z$$

$$+3\ Y\ a\ b^2\ q\ w^2\ z+10\ a^2\ b^2\ w^3\ z+4\ a^2\ b\ d\ w^3\ z-4\ a\ b^3\ c\ w^3+2\ a\ b^3\ w^3\ z$$

$$+5\ Y\ a^3\ b^2\ w-Y\ a^2\ b^3\ w-9\ Y\ a^2\ b\ q\ w\ z-Y\ a\ b^2\ q\ w\ z+2\ Y\ a\ q^2\ w\ z^2$$

$$-4\ a^2\ b^2\ c\ w^2-10\ a^2\ b^2\ w^2\ z-6\ a^2\ b\ d\ w^2\ z+4\ a\ b^3\ c\ w^2-3\ a\ b^3\ w^2\ z$$

$$-2\ a\ b^2\ d\ w^2\ z+6\ a\ b\ c\ q\ w^2\ z+2\ a\ b\ q\ w^2\ z^2+2\ b^2\ c\ q\ w^2\ z-b^2\ q\ w^2\ z^2$$

$$-Y\ a^3\ b^2+3\ Y\ a^2\ b\ q\ z-2\ Y\ a\ q^2\ z^2+4\ a^2\ b^2\ c\ w+5\ a^2\ b^2\ w\ z$$

$$+4\ a^2\ b\ d\ w\ z-a\ b^3\ c\ w+a\ b^3\ w\ z+a\ b^2\ d\ w\ z-6\ a\ b\ c\ q\ w\ z$$

$$-3\ a\ b\ q\ w\ z^2-2\ a\ d\ q\ w\ z^2-b^2\ c\ q\ w\ z+b^2\ q\ w\ z^2+b\ d\ q\ w\ z^2-a^2\ b^2\ c$$

$$-a^2\ b^2\ z-a^2\ b\ d\ z+3\ a\ b\ c\ q\ z+a\ b\ q\ z^2+a\ d\ q\ z^2-2\ c\ q^2\ z^2)\Big/$$

$$(4\ a^2\ b^2\ w^4+4\ a^3\ b\ w^3-4\ a^2\ b^2\ w^3+4\ a\ b^3\ w^3-4\ a^3\ b\ w^2+5\ a^2\ b^2\ w^2$$

$$-2\ a^2\ q\ w^2\ z-4\ a\ b^3\ w^2-13\ a\ b\ q\ w^2\ z-2\ b^2\ q\ w^2\ z+a^3\ b\ w-4\ a^2\ b^2\ w$$

$$+a^2\ q\ w\ z+a\ b^3\ w+12\ a\ b\ q\ w\ z+b^2\ q\ w\ z+a^2\ b^2-5\ a\ b\ q\ z+4\ z^2\ q^2),\ p$$

$$=-(4\ Y\ a^2\ b^3\ w^4+4\ Y\ a^3\ b^2\ w^3-8\ Y\ a^2\ b^3\ w^3-6\ Y\ a^2\ b\ q\ w^3\ z$$

$$-2\,Y\,a\,b^2\,q\,w^3\,z-4\,a^2\,b^2\,w^4\,z-8\,Y\,a^3\,b^2\,w^2+5\,Y\,a^2\,b^3\,w^2$$

$$+12\,Y\,a^2\,b\,q\,w^2\,z+3\,Y\,a\,b^2\,q\,w^2\,z+10\,a^2\,b^2\,w^3\,z+4\,a^2\,b\,d\,w^3\,z$$

$$-4\,a\,b^3\,c\,w^3+2\,a\,b^3\,w^3\,z+5\,Y\,a^3\,b^2\,w-Y\,a^2\,b^3\,w-9\,Y\,a^2\,b\,q\,w\,z$$

$$-Y\,a\,b^2\,q\,w\,z+2\,Y\,a\,q^2\,w\,z^2-4\,a^2\,b^2\,c\,w^2-10\,a^2\,b^2\,w^2\,z-6\,a^2\,b\,d\,w^2\,z$$

$$+4\,a\,b^3\,c\,w^2-3\,a\,b^3\,w^2\,z-2\,a\,b^2\,d\,w^2\,z+6\,a\,b\,c\,q\,w^2\,z+2\,a\,b\,q\,w^2\,z^2$$

$$+2\,b^2\,c\,q\,w^2\,z-b^2\,q\,w^2\,z^2-Y\,a^3\,b^2+3\,Y\,a^2\,b\,q\,z-2\,Y\,a\,q^2\,z^2$$

$$+4\,a^2\,b^2\,c\,w+5\,a^2\,b^2\,w\,z+4\,a^2\,b\,d\,w\,z-a\,b^3\,c\,w+a\,b^3\,w\,z+a\,b^2\,d\,w\,z$$

$$-6\,a\,b\,c\,q\,w\,z-3\,a\,b\,q\,w\,z^2-2\,a\,d\,q\,w\,z^2-b^2\,c\,q\,w\,z+b^2\,q\,w\,z^2$$

$$+b\,d\,q\,w\,z^2-a^2\,b^2\,c-a^2\,b^2\,z-a^2\,b\,d\,z+3\,a\,b\,c\,q\,z+a\,b\,q\,z^2+a\,d\,q\,z^2$$

$$-2\,c\,q^2\,z^2\big)\Big/\big(4\,a^2\,b^2\,w^4+4\,a^3\,b\,w^3-4\,a^2\,b^2\,w^3+4\,a\,b^3\,w^3-4\,a^3\,b\,w^2$$

$$+5\,a^2\,b^2\,w^2-2\,a^2\,q\,w^2\,z-4\,a\,b^3\,w^2-13\,a\,b\,q\,w^2\,z-2\,b^2\,q\,w^2\,z+a^3\,b\,w$$

$$-4\,a^2\,b^2\,w+a^2\,q\,w\,z+a\,b^3\,w+12\,a\,b\,q\,w\,z+b^2\,q\,w\,z+a^2\,b^2-5\,a\,b\,q\,z$$

$$+4\,z^2\,q^2\big),\ r=-\big(-4\,Y\,a^2\,b^2\,q\,w^4+2\,Y\,a^3\,b\,q\,w^3+10\,Y\,a^2\,b^2\,q\,w^3$$
$$+4\,a^3\,b^2\,w^4-3\,Y\,a^3\,b\,q\,w^2-10\,Y\,a^2\,b^2\,q\,w^2-Y\,a^2\,q^2\,w^2\,z+2\,Y\,a\,b\,q^2\,w^2\,z$$
$$-8\,a^3\,b^2\,w^3-4\,a^3\,b\,d\,w^3+4\,a^2\,b^3\,w^3-2\,a^2\,b\,q\,w^3\,z+4\,a\,b^2\,c\,q\,w^3$$
$$-6\,a\,b^2\,q\,w^3\,z+Y\,a^3\,b\,q\,w+5\,Y\,a^2\,b^2\,q\,w+Y\,a^2\,q^2\,w\,z-3\,Y\,a\,b\,q^2\,w\,z$$
$$+5\,a^3\,b^2\,w^2+4\,a^3\,b\,d\,w^2-8\,a^2\,b^3\,w^2-4\,a^2\,b^2\,d\,w^2-2\,a^2\,b\,c\,q\,w^2$$
$$+3\,a^2\,b\,q\,w^2\,z+2\,a^2\,d\,q\,w^2\,z-6\,a\,b^2\,c\,q\,w^2+12\,a\,b^2\,q\,w^2\,z$$
$$+6\,a\,b\,d\,q\,w^2\,z-Y\,a^2\,b^2\,q+Y\,a\,b\,q^2\,z-a^3\,b^2\,w-a^3\,b\,d\,w+5\,a^2\,b^3\,w$$
$$+4\,a^2\,b^2\,d\,w+a^2\,b\,c\,q\,w-a^2\,b\,q\,w\,z-a^2\,d\,q\,w\,z+4\,a\,b^2\,c\,q\,w$$
$$-9\,a\,b^2\,q\,w\,z-6\,a\,b\,d\,q\,w\,z+a\,c\,q^2\,w\,z-2\,b\,c\,q^2\,w\,z+2\,b\,q^2\,w\,z^2$$
$$-a^2\,b^3-a^2\,b^2\,d-a\,b^2\,c\,q+3\,a\,b^2\,q\,z+3\,a\,b\,d\,q\,z+b\,c\,q^2\,z-2\,b\,q^2\,z^2$$
$$-2\,d\,q^2\,z^2\big)\Big/\big(4\,a^2\,b^2\,w^4+4\,a^3\,b\,w^3-4\,a^2\,b^2\,w^3+4\,a\,b^3\,w^3-4\,a^3\,b\,w^2$$
$$+5\,a^2\,b^2\,w^2-2\,a^2\,q\,w^2\,z-4\,a\,b^3\,w^2-13\,a\,b\,q\,w^2\,z-2\,b^2\,q\,w^2\,z+a^3\,b\,w$$
$$-4\,a^2\,b^2\,w+a^2\,q\,w\,z+a\,b^3\,w+12\,a\,b\,q\,w\,z+b^2\,q\,w\,z+a^2\,b^2-5\,a\,b\,q\,z$$

$$+4\ z^2\ q^2)\}$$

```
> map( simplify, (11) ) ;
```

$$\left\{ e = \left(-2\ ((2\ w^2 - 3\ w + 1)\ b + (Y\ q - 2\ d)\ w - Y\ q + d)\ w\ b \left(w - \frac{1}{2} \right) a^3 + \left((\right. \right. \qquad (12)$$

$$-4\ w^3 + 8\ w^2 - 5\ w + 1)\ b^3 + 4 \left(Y\ q\ w^3 - 2\ Y\ q\ w^2 + \left(\frac{3\ Y\ q}{2} + d \right) w - \frac{Y\ q}{2} \right.$$

$$\left. - \frac{d}{2} \right) \left(w - \frac{1}{2} \right) b^2 + 2\ (w\ z + c - z)\ w\ q \left(w - \frac{1}{2} \right) b + w\ q\ ((Y\ q - 2\ d)\ w - Y\ q$$

$$+ d)\ z \Big) a^2 - 2\ q \left(2 \left(w^2 - w + \frac{1}{2} \right) \left(\left(c - \frac{3\ z}{2} \right) w - \frac{c}{2} + \frac{3\ z}{2} \right) b^2 + \left((Y\ q \right. \right.$$

$$+ 3\ d)\ w^2 + \left(-\frac{3\ Y\ q}{2} - 3\ d \right) w + \frac{Y\ q}{2} + \frac{3\ d}{2} \Big) z\ b + \frac{c\ q\ w\ z}{2} \Big) a + 2\ q^2 \left(\left((c \right. \right.$$

$$\left. \left. - z)\ w - \frac{c}{2} + z \right) b + d\ z \right) z \Big) \Big/ \left(4\ w\ b \left(w - \frac{1}{2} \right)^2 a^3 + 4 \left((w^2 + 1) \left(w \right. \right. \right.$$

$$\left. \left. \left. - \frac{1}{2} \right) b^2 - \frac{q\ w\ z}{2} \right) \left(w - \frac{1}{2} \right) a^2 + 4\ b \left(w \left(w - \frac{1}{2} \right)^2 b^2 \right. \right.$$

$$-\frac{13\left(w^2-\frac{12}{13}\,w+\frac{5}{13}\right)q\,z}{4}\Bigg)\,a-2\,q\left(\left(w^2-\frac{1}{2}\,w\right)b^2-2\,z\,q\right)z\Bigg),\ i=\Bigg($$

$$-4\left(Y\left(w-\frac{1}{2}\right)(w-1)\,a+\left(-c+\frac{z}{2}\right)w+\frac{c}{2}-\frac{z}{2}\right)w\,a\left(w-\frac{1}{2}\right)b^3+\Bigg(-4\,(w$$

$$-1)\,Y\left(w-\frac{1}{2}\right)^2a^3+4\left(w^3\,z-2\,w^2\,z+\left(c+\frac{3\,z}{2}\right)w-\frac{c}{2}-\frac{z}{2}\right)\left(w-\frac{1}{2}\right)a^2$$

$$+2\,(Y\,q\,w-Y\,q+d)\,w\,z\left(w-\frac{1}{2}\right)a-2\left(\left(c-\frac{z}{2}\right)w-\frac{c}{2}+\frac{z}{2}\right)w\,q\,z\Bigg)b^2$$

$$+6\left(\left(w^2-w+\frac{1}{2}\right)\left(\left(Y\,q-\frac{2\,d}{3}\right)w-Y\,q+\frac{d}{3}\right)a^2-\Bigg(\left(c+\frac{z}{3}\right)w^2+\Bigg(-c$$

$$-\frac{z}{2}\Bigg)w+\frac{c}{2}+\frac{z}{6}\Bigg)q\,a-\frac{d\,q\,w\,z}{6}\Bigg)z\,b-2\left(\left((Y\,q-d)\,w-Y\,q+\frac{d}{2}\right)a$$

$$-c\,q\Bigg)q\,z^2\Bigg)\Bigg/\Bigg(4\,w\,a\left(w-\frac{1}{2}\right)^2b^3+4\left((w^2+1)\left(w-\frac{1}{2}\right)a^2-\frac{q\,w\,z}{2}\right)\Bigg(w$$

$$-\frac{1}{2}\Bigg)b^2+4\left(w\left(w-\frac{1}{2}\right)^2a^2-\frac{13\left(w^2-\frac{12}{13}\,w+\frac{5}{13}\right)q\,z}{4}\right)a\,b-2\left(\left(w^2\right.\right.$$

$$-\frac{1}{2}\ w\Big)\ a^2-2\ z\ q\Big)\ q\ z\Big),\ p=\Big(-4\ \Big(Y\ \Big(w-\frac{1}{2}\Big)\ (w-1)\ a+\Big(-c+\frac{z}{2}\Big)\ w$$

$$+\frac{c}{2}-\frac{z}{2}\Big)\ w\ a\ \Big(w-\frac{1}{2}\Big)\ b^3+\Big(-4\ (w-1)\ Y\ \Big(w-\frac{1}{2}\Big)^2\ a^3+4\ \Big(w^3\ z-2\ w^2\ z$$

$$+\Big(c+\frac{3\ z}{2}\Big)\ w-\frac{c}{2}-\frac{z}{2}\Big)\ \Big(w-\frac{1}{2}\Big)\ a^2+2\ (Y\ q\ w-Y\ q+d)\ w\ z\ \Big(w-\frac{1}{2}\Big)\ a$$

$$-2\ \Big(\Big(c-\frac{z}{2}\Big)\ w-\frac{c}{2}+\frac{z}{2}\Big)\ w\ q\ z\Big)\ b^2+6\ \Big(\Big(w^2-w+\frac{1}{2}\Big)\ \Big(\Big(Y\ q-\frac{2\ d}{3}\Big)\ w$$

$$-Y\ q+\frac{d}{3}\Big)\ a^2-\Big(\Big(c+\frac{z}{3}\Big)\ w^2+\Big(-c-\frac{z}{2}\Big)\ w+\frac{c}{2}+\frac{z}{6}\Big)\ q\ a-\frac{d\ q\ w\ z}{6}\Big)\ z\ b$$

$$-2\ \Big(\Big((Y\ q-d)\ w-Y\ q+\frac{d}{2}\Big)\ a-c\ q\Big)\ q\ z^2\Big)\Big/\Big(4\ w\ a\ \Big(w-\frac{1}{2}\Big)^2\ b^3$$

$$+4\ \Big((w^2+1)\ \Big(w-\frac{1}{2}\Big)\ a^2-\frac{q\ w\ z}{2}\Big)\ \Big(w-\frac{1}{2}\Big)\ b^2+4\ \Big(w\ \Big(w-\frac{1}{2}\Big)^2\ a^2$$

$$-\frac{13\ \Big(w^2-\frac{12}{13}\ w+\frac{5}{13}\Big)\ q\ z}{4}\Big)\ a\ b-2\ \Big(\Big(w^2-\frac{1}{2}\ w\Big)\ a^2-2\ z\ q\Big)\ q\ z\Big),\ r$$

$$= \left(-2\ \left(\left(2\ w^2 - 3\ w + 1 \right)\ b + \left(Y\ q - 2\ d \right)\ w - Y\ q + d \right)\ w\ b\ \left(w - \frac{1}{2} \right)\ a^3 + \left(\left(\right. \right.$$

$$-4\ w^3 + 8\ w^2 - 5\ w + 1 \Big)\ b^3 + 4\ \left(Y\ q\ w^3 - 2\ Y\ q\ w^2 + \left(\frac{3\ Y\ q}{2} + d \right)\ w - \frac{Y\ q}{2} \right.$$

$$\left. - \frac{d}{2} \right)\ \left(w - \frac{1}{2} \right)\ b^2 + 2\ \left(w\ z + c - z \right)\ w\ q\ \left(w - \frac{1}{2} \right)\ b + w\ q\ \left(\left(Y\ q - 2\ d \right)\ w - Y\ q \right.$$

$$\left. + d \right)\ z \Big)\ a^2 - 2\ q\ \left(2\ \left(w^2 - w + \frac{1}{2} \right)\ \left(\left(c - \frac{3\ z}{2} \right)\ w - \frac{c}{2} + \frac{3\ z}{2} \right)\ b^2 + \left(\left(Y\ q \right. \right.$$

$$\left. + 3\ d \right)\ w^2 + \left(-\frac{3\ Y\ q}{2} - 3\ d \right)\ w + \frac{Y\ q}{2} + \frac{3\ d}{2} \Big)\ z\ b + \frac{c\ q\ w\ z}{2} \Big)\ a + 2\ q^2\ \left(\left(\left(c \right. \right. \right.$$

$$\left. \left. - z \right)\ w - \frac{c}{2} + z \right)\ b + d\ z \Big)\ z \Big) \Big/ \left(4\ w\ b\ \left(w - \frac{1}{2} \right)^2\ a^3 + 4\ \left(\left(w^2 + 1 \right)\ \left(w \right. \right. \right.$$

$$\left. \left. - \frac{1}{2} \right)\ b^2 - \frac{q\ w\ z}{2} \right)\ \left(w - \frac{1}{2} \right)\ a^2 + 4\ b\ \left(w\ \left(w - \frac{1}{2} \right)^2\ b^2 \right.$$

$$\left. \left. - \frac{13\ \left(w^2 - \frac{12}{13}\ w + \frac{5}{13} \right)\ q\ z}{4} \right)\ a - 2\ q\ \left(\left(w^2 - \frac{1}{2}\ w \right)\ b^2 - 2\ z\ q \right)\ z \right) \right\}$$

```
> subs(p=(-4*(Y*(w - 1/2)*(w - 1)*a + (-c + z/2)*w + c/2 - z/2)*w*a*(w - 1/2)
  *b^3 + (-4*(w - 1)*Y*(w - 1/2)^2*a^3 + 4*(w^3*z - 2*w^2*z + (c + (3*z)/2)*w
  - c/2 - z/2)*(w - 1/2)*a^2 + 2*(Y*q*w - Y*q + d)*w*z*(w - 1/2)*a - 2*((c -
  z/2)*w - c/2 + z/2)*w*q*z)*b^2 + 6*((w^2 - w + 1/2)*((Y*q - (2*d)/3)*w - Y*
  q + d/3)*a^2 - ((c + z/3)*w^2 + (-c - z/2)*w + c/2 + z/6)*q*a - d*q*w*z/6)*
  z*b - 2*(((Y*q - d)*w - Y*q + d/2)*a - c*q)*q*z^2)/(4*w*a*(w - 1/2)^2*b^3 +
  4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2
  - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*z*q)*q*
  z),x=(c+a*(w*y+(1-w)*n)-p)/z);
```

$$x = \frac{1}{z} \left(c + a\ \left(w\ y + \left(1 - w \right)\ n \right) - \left(-4\ \left(Y\ \left(w - \frac{1}{2} \right)\ \left(w - 1 \right)\ a + \left(-c + \frac{z}{2} \right)\ w + \frac{c}{2} \right. \right. \right. \quad \textbf{(13)}$$

$$\left. - \frac{z}{2} \right)\ w\ a\ \left(w - \frac{1}{2} \right)\ b^3 + \left(-4\ \left(w - 1 \right)\ Y\ \left(w - \frac{1}{2} \right)^2\ a^3 + 4\ \left(w^3\ z - 2\ w^2\ z + \left(c \right. \right. \right.$$

$$\left. \left. + \frac{3\ z}{2} \right)\ w - \frac{c}{2} - \frac{z}{2} \right)\ \left(w - \frac{1}{2} \right)\ a^2 + 2\ \left(Y\ q\ w - q\ Y + d \right)\ w\ z\ \left(w - \frac{1}{2} \right)\ a$$

$$-2\left(\left(\left(c-\frac{z}{2}\right)w-\frac{c}{2}+\frac{z}{2}\right)wqz\right)b^2+6\left(\left(\left(w^2-w+\frac{1}{2}\right)\left(\left(\left(qY-\frac{2d}{3}\right)w\right.\right.\right.\right.$$

$$\left.\left.\left.\left.-qY+\frac{d}{3}\right)a^2-\left(\left(c+\frac{z}{3}\right)w^2+\left(-c-\frac{z}{2}\right)w+\frac{c}{2}+\frac{z}{6}\right)qa-\frac{dqwz}{6}\right)zb\right.\right.$$

$$\left.\left.-2\left(\left(\left(qY-d\right)w-qY+\frac{d}{2}\right)a-cq\right)qz^2\right)\right/\left(4wa\left(w-\frac{1}{2}\right)^2b^3\right.$$

$$+4\left(\left(w^2+1\right)\left(w-\frac{1}{2}\right)a^2-\frac{qwz}{2}\right)\left(w-\frac{1}{2}\right)b^2+4\left(w\left(w-\frac{1}{2}\right)^2a^2\right.$$

$$\left.\left.-\frac{13\left(w^2-\frac{12}{13}w+\frac{5}{13}\right)qz}{4}\right)ab-2\left(\left(w^2-\frac{1}{2}w\right)a^2-2qz\right)qz\right)\right)$$

```
> subs(i=(-4*(Y*(w - 1/2)*(w - 1)*a + (-c + z/2)*w + c/2 - z/2)*w*a*(w - 1/2)
  *b^3 + (-4*(w - 1)*Y*(w - 1/2)^2*a^3 + 4*(w^3*z - 2*w^2*z + (c + (3*z)/2)*w
  - c/2 - z/2)*(w - 1/2)*a^2 + 2*(Y*q*w - Y*q + d)*w*z*(w - 1/2)*a - 2*((c -
  z/2)*w - c/2 + z/2)*w*q*z)*b^2 + 6*((w^2 - w + 1/2)*((Y*q - (2*d)/3)*w - Y*
  q + d/3)*a^2 - ((c + z/3)*w^2 + (-c - z/2)*w + c/2 + z/6)*q*a - d*q*w*z/6)*
  z*b - 2*(((Y*q - d)*w - Y*q + d/2)*a - c*q)*q*z^2)/(4*w*a*(w - 1/2)^2*b^3 +
  4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2
  - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*z*q)*q*
  z),m=1-(c+a*(Y+(w-1)*y-w*n)-i)/z);
```

$$m=1-\frac{1}{z}\left(c+a\left(Y+(w-1)y-wn\right)-\left(-4\left(Y\left(w-\frac{1}{2}\right)(w-1)a+\left(-c\right.\right.\right.\right. \tag{14}$$

$$\left.\left.+\frac{z}{2}\right)w+\frac{c}{2}-\frac{z}{2}\right)wa\left(w-\frac{1}{2}\right)b^3+\left(-4(w-1)Y\left(w-\frac{1}{2}\right)^2a^3+4\left(w^3z\right.\right.$$

$$\left.-2w^2z+\left(c+\frac{3z}{2}\right)w-\frac{c}{2}-\frac{z}{2}\right)\left(w-\frac{1}{2}\right)a^2+2(Yqw-qY+d)wz\left(w\right.$$

$$\left.-\frac{1}{2}\right)a-2\left(\left(c-\frac{z}{2}\right)w-\frac{c}{2}+\frac{z}{2}\right)wqz\right)b^2+6\left(\left(w^2-w+\frac{1}{2}\right)\left(\left(qY\right.\right.$$

$$\left.\left.-\frac{2d}{3}\right)w-qY+\frac{d}{3}\right)a^2-\left(\left(c+\frac{z}{3}\right)w^2+\left(-c-\frac{z}{2}\right)w+\frac{c}{2}+\frac{z}{6}\right)qa$$

$$\left.-\frac{dqwz}{6}\right)zb-2\left(\left(\left(qY-d\right)w-qY+\frac{d}{2}\right)a-cq\right)qz^2\Big)\Big/$$

$$\left(4\,w\,a\left(w-\frac{1}{2}\right)^2 b^3+4\left(\left(w^2+1\right)\left(w-\frac{1}{2}\right)a^2-\frac{q\,w\,z}{2}\right)\left(w-\frac{1}{2}\right)b^2+4\left(w\left(w-\frac{1}{2}\right)^2 a^2-\frac{13\left(w^2-\frac{12}{13}\,w+\frac{5}{13}\right)q\,z}{4}\right)a\,b-2\left(\left(w^2-\frac{1}{2}\,w\right)a^2-2\,q\,z\right)q\,z\right)\right)$$

```
> subs(r=(-2*((2*w^2 - 3*w + 1)*b + (Y*q - 2*d)*w - Y*q + d)*w*b*(w - 1/2)*
  a^3 + ((-4*w^3 + 8*w^2 - 5*w + 1)*b^3 + 4*(Y*q*w^3 - 2*Y*q*w^2 + ((3*Y*q)/2
  + d)*w - Y*q/2 - d/2)*(w - 1/2)*b^2 + 2*(w*z + c - z)*w*q*(w - 1/2)*b + w*
  q*((Y*q - 2*d)*w - Y*q + d)*z)*a^2 - 2*q*(2*(w^2 - w + 1/2)*((c - (3*z)/2)*
  w - c/2 + (3*z)/2)*b^2 + ((Y*q + 3*d)*w^2 + (-(3*Y*q)/2 - 3*d)*w + Y*q/2 +
  (3*d)/2)*z*b + c*q*w*z/2)*a + 2*q^2*(((c - z)*w - c/2 + z)*b + d*z)*z)/(4*
  w*b*(w - 1/2)^2*a^3 + 4*((w^2 + 1)*(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 +
  4*b*(w*(w - 1/2)^2*b^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 -
  1/2*w)*b^2 - 2*z*q)*z),y=(d+b*(w*x+(1-w)*m)-r)/q);
```

$$y=\frac{1}{q}\left(d+b\,(w\,x+(1-w)\,m)-\left(-2\,((2\,w^2-3\,w+1)\,b+(q\,Y-2\,d)\,w-q\,Y+d)\,w\,b\left(w-\frac{1}{2}\right)a^3+\left((-4\,w^3+8\,w^2-5\,w+1)\,b^3+4\left(Y\,q\,w^3-2\,Y\,q\,w^2+\left(\frac{3\,q\,Y}{2}+d\right)w-\frac{q\,Y}{2}-\frac{d}{2}\right)\left(w-\frac{1}{2}\right)b^2+2\,(w\,z+c-z)\,w\,q\left(w-\frac{1}{2}\right)b+w\,q\,((q\,Y-2\,d)\,w-q\,Y+d)\,z\right)a^2-2\,q\left(2\left(w^2-w+\frac{1}{2}\right)\left(\left(c-\frac{3\,z}{2}\right)w-\frac{c}{2}+\frac{3\,z}{2}\right)b^2+\left((q\,Y+3\,d)\,w^2+\left(-\frac{3\,q\,Y}{2}-3\,d\right)w+\frac{q\,Y}{2}+\frac{3\,d}{2}\right)z\,b+\frac{c\,q\,w\,z}{2}\right)a+2\,q^2\left(\left((c-z)\,w-\frac{c}{2}+z\right)b+d\,z\right)z\right)\Big/\left(4\,w\,b\left(w-\frac{1}{2}\right)^2 a^3+4\left(\left(w^2+1\right)\left(w-\frac{1}{2}\right)b^2-\frac{q\,w\,z}{2}\right)\left(w-\frac{1}{2}\right)a^2+4\,b\left(w\left(w-\frac{1}{2}\right)^2 b^2-\frac{13\left(w^2-\frac{12}{13}\,w+\frac{5}{13}\right)q\,z}{4}\right)a-2\,q\left(\left(w^2-\frac{1}{2}\,w\right)b^2-2\,q\,z\right)z\right)\right) \quad (15)$$

```
)
```

```
> subs(e=(-2*((2*w^2 - 3*w + 1)*b + (Y*q - 2*d)*w - Y*q + d)*w*b*(w - 1/2)*
  a^3 + ((-4*w^3 + 8*w^2 - 5*w + 1)*b^3 + 4*(Y*q*w^3 - 2*Y*q*w^2 + ((3*Y*q)/2
  + d)*w - Y*q/2 - d/2)*(w - 1/2)*b^2 + 2*(w*z + c - z)*w*q*(w - 1/2)*b + w*
  q*((Y*q - 2*d)*w - Y*q + d)*z)*a^2 - 2*q*(2*((w^2 - w + 1/2)*((c - (3*z)/2)*
  w - c/2 + (3*z)/2)*b^2 + ((Y*q + 3*d)*w^2 + (-(3*Y*q)/2 - 3*d)*w + Y*q/2 +
  (3*d)/2)*z*b + c*q*w*z/2)*a + 2*q^2*(((c - z)*w - c/2 + z)*b + d*z)*z)/(4*
  w*b*(w - 1/2)^2*a^3 + 4*((w^2 + 1)*(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 +
  4*b*(w*(w - 1/2)^2*b^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 -
  1/2*w)*b^2 - 2*z*q)*z),n=Y-(d+b*(1+(w-1)*x-w*m)-e)/q);
```

$$n = Y - \frac{1}{q}\left(d + b\ (1 + (w-1)\ x - w\ m) - \left(-2\ (((2\ w^2 - 3\ w + 1)\ b + (q\ Y - 2\ d)\ w \right. \right. \tag{16}$$

$$- q\ Y + d)\ w\ b\left(w - \frac{1}{2}\right)\ a^3 + \left((-4\ w^3 + 8\ w^2 - 5\ w + 1)\ b^3 + 4\ \left(Y\ q\ w^3\right.\right.$$

$$- 2\ Y\ q\ w^2 + \left(\frac{3\ q\ Y}{2} + d\right)\ w - \frac{q\ Y}{2} - \frac{d}{2}\right)\left(w - \frac{1}{2}\right)\ b^2 + 2\ (w\ z + c - z)\ w\ q\ \left(w\right.$$

$$\left. - \frac{1}{2}\right)\ b + w\ q\ ((q\ Y - 2\ d)\ w - q\ Y + d)\ z\Big)\ a^2 - 2\ q\left(2\ \left(w^2 - w + \frac{1}{2}\right)\ \left(\left(c\right.\right.\right.$$

$$\left. - \frac{3\ z}{2}\right)\ w - \frac{c}{2} + \frac{3\ z}{2}\right)\ b^2 + \left((q\ Y + 3\ d)\ w^2 + \left(-\frac{3\ q\ Y}{2} - 3\ d\right)\ w + \frac{q\ Y}{2}\right.$$

$$\left. + \frac{3\ d}{2}\right)\ z\ b + \frac{c\ q\ w\ z}{2}\Big)\ a + 2\ q^2\ \left(\left((c - z)\ w - \frac{c}{2} + z\right)\ b + d\ z\right)\ z\Big)\Big/$$

$$\left(4\ w\ b\left(w - \frac{1}{2}\right)^2\ a^3 + 4\ \left((w^2 + 1)\ \left(w - \frac{1}{2}\right)\ b^2 - \frac{q\ w\ z}{2}\right)\ \left(w - \frac{1}{2}\right)\ a^2\right.$$

$$+ 4\ b\left(w\left(w - \frac{1}{2}\right)^2\ b^2 - \frac{13\ \left(w^2 - \frac{12}{13}\ w + \frac{5}{13}\right)\ q\ z}{4}\right)\ a - 2\ q\ \left(\left(w^2 - \frac{1}{2}\ w\right)\ b^2\right.$$

$$\left.\left. - 2\ q\ z\right)\ z\right)\Big)$$

```
> eqns:={x = (c + a*(w*y + (1 - w)*n) - (-4*(Y*(w - 1/2)*(w - 1)*a + (-c +
  z/2)*w + c/2 - z/2)*w*a*(w - 1/2)*b^3 + (-4*(w - 1)*Y*(w - 1/2)^2*a^3 + 4*
  (w^3*z - 2*w^2*z + (c + (3*z)/2)*w - c/2 - z/2)*(w - 1/2)*a^2 + 2*(Y*q*w -
```

```
Y*q + d)*w*z*(w - 1/2)*a - 2*((c - z/2)*w - c/2 + z/2)*w*q*z)*b^2 + 6*((w^2
- w + 1/2)*((q*Y - (2*d)/3)*w - q*Y + d/3)*a^2 - ((c + z/3)*w^2 + (-c -
z/2)*w + c/2 + z/6)*q*a - d*q*w*z/6)*z*b - 2*(((Y*q - d)*w - q*Y + d/2)*a -
c*q)*q*z^2)/(4*w*a*(w - 1/2)^2*b^3 + 4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*z/2)*
(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a*b
- 2*((w^2 - 1/2*w)*a^2 - 2*q*z)*q*z))/z,m = 1 - (c + a*(Y + (w - 1)*y - w*
n) - (-4*(Y*(w - 1/2)*(w - 1)*a + (-c + z/2)*w + c/2 - z/2)*w*a*(w - 1/2)*
b^3 + (-4*(w - 1)*Y*(w - 1/2)^2*a^3 + 4*(w^3*z - 2*w^2*z + (c + (3*z)/2)*w
- c/2 - z/2)*(w - 1/2)*a^2 + 2*(Y*q*w - Y*q + d)*w*z*(w - 1/2)*a - 2*((c -
z/2)*w - c/2 + z/2)*w*q*z)*b^2 + 6*((w^2 - w + 1/2)*((q*Y - (2*d)/3)*w - q*
Y + d/3)*a^2 - ((c + z/3)*w^2 + (-c - z/2)*w + c/2 + z/6)*q*a - d*q*w*z/6)*
z*b - 2*(((Y*q - d)*w - q*Y + d/2)*a - c*q)*q*z^2)/(4*w*a*(w - 1/2)^2*b^3 +
4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2
- 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*q*z)*q*z)
)/z,y = (d + b*(w*x + (1 - w)*m) - (-2*((2*w^2 - 3*w + 1)*b + (Y*q - 2*d)*w
- q*Y + d)*w*b*(w - 1/2)*a^3 + ((-4*w^3 + 8*w^2 - 5*w + 1)*b^3 + 4*(Y*q*w^3
- 2*Y*q*w^2 + ((3*q*Y)/2 + d)*w - q*Y/2 - d/2)*(w - 1/2)*b^2 + 2*(w*z + c -
z)*w*q*(w - 1/2)*b + w*q*((Y*q - 2*d)*w - q*Y + d)*z)*a^2 - 2*q*(2*(w^2 - w
+ 1/2)*((c - (3*z)/2)*w - c/2 + (3*z)/2)*b^2 + ((Y*q + 3*d)*w^2 + (-(3*q*Y)
/2 - 3*d)*w + q*Y/2 + (3*d)/2)*z*b + c*q*w*z/2)*a + 2*q^2*(((c - z)*w - c/2
+ z)*b + d*z)*z)/(4*w*b*(w - 1/2)^2*a^3 + 4*((w^2 + 1)*(w - 1/2)*b^2 - q*w*
z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*b^2 - 13*(w^2 - 12/13*w + 5/13)*q*
z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*q*z)*z))/q,n = Y - (d + b*(1 + (w - 1)*
x - w*m) - (-2*((2*w^2 - 3*w + 1)*b + (Y*q - 2*d)*w - q*Y + d)*w*b*(w -
1/2)*a^3 + ((-4*w^3 + 8*w^2 - 5*w + 1)*b^3 + 4*(Y*q*w^3 - 2*Y*q*w^2 + ((3*
q*Y)/2 + d)*w - q*Y/2 - d/2)*(w - 1/2)*b^2 + 2*(w*z + c - z)*w*q*(w - 1/2)*
b + w*q*((Y*q - 2*d)*w - q*Y + d)*z)*a^2 - 2*q*(2*(w^2 - w + 1/2)*((c - (3*
z)/2)*w - c/2 + (3*z)/2)*b^2 + ((Y*q + 3*d)*w^2 + (-(3*q*Y)/2 - 3*d)*w + q*
Y/2 + (3*d)/2)*z*b + c*q*w*z/2)*a + 2*q^2*(((c - z)*w - c/2 + z)*b + d*z)*
z)/(4*w*b*(w - 1/2)^2*a^3 + 4*((w^2 + 1)*(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)
*a^2 + 4*b*(w*(w - 1/2)^2*b^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a - 2*q*(
(w^2 - 1/2*w)*b^2 - 2*q*z)*z))/q};
```

$$eqns := \{ m = 1 - \frac{1}{z} (c + a \; (Y + (w-1) \; y - w \; n) - (-4 \; (Y \; (w - \frac{1}{2}) \; (w-1) \; a + ($$

$$-c + \frac{z}{2}) \; w + \frac{c}{2} - \frac{z}{2}) \; w \; a \; (w - \frac{1}{2}) \; b^3 + (-4 \; (w-1) \; Y \; (w - \frac{1}{2})^2 \; a^3 + 4 \; (w^3 \; z$$

$$-2\ w^2\ z+\left(c+\frac{3\ z}{2}\right)\ w-\frac{c}{2}-\frac{z}{2}\right)\ \left(w-\frac{1}{2}\right)\ a^2+2\ (Y\ q\ w-q\ Y+d)\ w\ z\ \left(w$$

$$-\frac{1}{2}\right)\ a-2\ \left(\left(c-\frac{z}{2}\right)\ w-\frac{c}{2}+\frac{z}{2}\right)\ w\ q\ z\right)\ b^2+6\ \left(\left(w^2-w+\frac{1}{2}\right)\ \left(\left(q\ Y\right.\right.$$

$$-\frac{2\ d}{3}\right)\ w-q\ Y+\frac{d}{3}\right)\ a^2-\left(\left(c+\frac{z}{3}\right)\ w^2+\left(-c-\frac{z}{2}\right)\ w+\frac{c}{2}+\frac{z}{6}\right)\ q\ a$$

$$-\frac{d\ q\ w\ z}{6}\right)\ z\ b-2\ \left(\left(\left(q\ Y-d\right)\ w-q\ Y+\frac{d}{2}\right)\ a-c\ q\right)\ q\ z^2\right)\Big/$$

$$\left(4\ w\ a\ \left(w-\frac{1}{2}\right)^2\ b^3+4\ \left(\left(w^2+1\right)\ \left(w-\frac{1}{2}\right)\ a^2-\frac{q\ w\ z}{2}\right)\ \left(w-\frac{1}{2}\right)\ b^2\right.$$

$$+4\ \left(w\ \left(w-\frac{1}{2}\right)^2\ a^2-\frac{13\ \left(w^2-\frac{12}{13}\ w+\frac{5}{13}\right)\ q\ z}{4}\right)\ a\ b-2\ \left(\left(w^2-\frac{1}{2}\ w\right)\ a^2\right.$$

$$-2\ q\ z\Big)\ q\ z\Big)\Big),\ n = Y - \frac{1}{q}\Bigg(d + b\ (1 + (w-1)\ x - w\ m) - \Big(-2\ ((2\ w^2$$

$$-3\ w+1)\ b + (q\ Y - 2\ d)\ w - q\ Y + d)\ w\ b\ \left(w - \frac{1}{2}\right)\ a^3 + \Big((-4\ w^3 + 8\ w^2$$

$$-5\ w+1)\ b^3 + 4\ \left(Y\ q\ w^3 - 2\ Y\ q\ w^2 + \left(\frac{3\ q\ Y}{2} + d\right)\ w - \frac{q\ Y}{2} - \frac{d}{2}\right)\ \Big(w$$

$$-\frac{1}{2}\Big)\ b^2 + 2\ (w\ z + c - z)\ w\ q\ \left(w - \frac{1}{2}\right)\ b + w\ q\ ((q\ Y - 2\ d)\ w - q\ Y + d)\ z\Big)$$

$$a^2 - 2\ q\ \left(2\ \left(w^2 - w + \frac{1}{2}\right)\ \left(\left(c - \frac{3\ z}{2}\right)\ w - \frac{c}{2} + \frac{3\ z}{2}\right)\ b^2 + \Big((q\ Y + 3\ d)\ w^2$$

$$+\left(-\frac{3\ q\ Y}{2} - 3\ d\right)\ w + \frac{q\ Y}{2} + \frac{3\ d}{2}\right)\ z\ b + \frac{c\ q\ w\ z}{2}\Big)\ a + 2\ q^2\ \Big(\Big((c-z)\ w - \frac{c}{2}$$

$$+z\Big)\ b+d\ z\Big)\ z\Big)\Big/\Bigg(4\ w\ b\left(w-\frac{1}{2}\right)^2\ a^3+4\left(\left(w^2+1\right)\ \left(w-\frac{1}{2}\right)\ b^2\right.$$

$$\left.-\frac{q\ w\ z}{2}\right)\ \left(w-\frac{1}{2}\right)\ a^2+4\ b\left(w\left(w-\frac{1}{2}\right)^2\ b^2-\frac{13\left(w^2-\frac{12}{13}\ w+\frac{5}{13}\right)\ q\ z}{4}\right)\ a$$

$$-2\ q\left(\left(w^2-\frac{1}{2}\ w\right)\ b^2-2\ q\ z\right)\ z\Bigg)\Bigg),\ x=\frac{1}{z}\Bigg(c+a\ (w\ y+(1-w)\ n)$$

$$-\left(-4\left(Y\left(w-\frac{1}{2}\right)\ (w-1)\ a+\left(-c+\frac{z}{2}\right)\ w+\frac{c}{2}-\frac{z}{2}\right)\ w\ a\left(w-\frac{1}{2}\right)\ b^3+\left(-4\ (w-1)\ Y\ \right.\right.$$

$$+4\left(w^3\ z-2\ w^2\ z+\left(c+\frac{3\ z}{2}\right)\ w-\frac{c}{2}-\frac{z}{2}\right)\left(w-\frac{1}{2}\right)\ a^2+2\ (Y\ q\ w-q\ Y$$

$$+d)\ w\ z\left(w-\frac{1}{2}\right)\ a-2\left(\left(c-\frac{z}{2}\right)\ w-\frac{c}{2}+\frac{z}{2}\right)\ w\ q\ z\Big)\ b^2+6\ \Big(\Big(w^2-w$$

$$+\frac{1}{2}\Bigg)\left(\left(q\ Y-\frac{2\ d}{3}\right)\ w-q\ Y+\frac{d}{3}\right)\ a^2-\left(\left(c+\frac{z}{3}\right)\ w^2+\left(-c-\frac{z}{2}\right)\ w+\frac{c}{2}$$

$$+\frac{z}{6}\Bigg)\ q\ a-\frac{d\ q\ w\ z}{6}\Bigg)\ z\ b-2\ \left(\left((q\ Y-d)\ w-q\ Y+\frac{d}{2}\right)\ a-c\ q\right)\ q\ z^2\Bigg)\Bigg/$$

$$\Bigg(4\ w\ a\left(w-\frac{1}{2}\right)^2\ b^3+4\left((w^2+1)\left(w-\frac{1}{2}\right)\ a^2-\frac{q\ w\ z}{2}\right)\left(w-\frac{1}{2}\right)\ b^2$$

$$+4\left(w\left(w-\frac{1}{2}\right)^2\ a^2-\frac{13\left(w^2-\frac{12}{13}\ w+\frac{5}{13}\right)\ q\ z}{4}\right)\ a\ b-2\left(\left(w^2-\frac{1}{2}\ w\right)\ a^2$$

$$-2\ q\ z\Bigg)\ q\ z\Bigg)\Bigg),\ y=\frac{1}{q}\Bigg(d+b\ (w\ x+(1-w)\ m)-\Bigg(-2\ ((2\ w^2-3\ w$$

$$+1)\ b+(q\ Y-2\ d)\ w-q\ Y+d)\ w\ b\left(w-\frac{1}{2}\right)\ a^3+\Bigg((-4\ w^3+8\ w^2-5\ w$$

$$+1)\ b^3+4\left(Y\ q\ w^3-2\ Y\ q\ w^2+\left(\frac{3\ q\ Y}{2}+d\right)\ w-\frac{q\ Y}{2}-\frac{d}{2}\right)\left(w-\frac{1}{2}\right)\ b^2$$

$$+2\ (w\ z+c-z)\ w\ q\left(w-\frac{1}{2}\right)\ b+w\ q\ ((q\ Y-2\ d)\ w-q\ Y+d)\ z\Bigg)\ a^2$$

$$-2\ q\left(2\left(w^2-w+\frac{1}{2}\right)\left(\left(c-\frac{3\ z}{2}\right)\ w-\frac{c}{2}+\frac{3\ z}{2}\right)\ b^2+\Bigg((q\ Y+3\ d)\ w^2+\Bigg($$

$$-\frac{3\ q\ Y}{2}-3\ d\Big)\ w+\frac{q\ Y}{2}+\frac{3\ d}{2}\Big)\ z\ b+\frac{c\ q\ w\ z}{2}\Big)\ a+2\ q^2\ \Big(\Big((c-z)\ w-\frac{c}{2}$$

$$+z\Big)\ b+d\ z\Big)\ z\Big)\Big/\Big(4\ w\ b\ \Big(w-\frac{1}{2}\Big)^2\ a^3+4\ \Big((w^2+1)\ \Big(w-\frac{1}{2}\Big)\ b^2$$

$$-\frac{q\ w\ z}{2}\Big)\ \Big(w-\frac{1}{2}\Big)\ a^2+4\ b\ \Big(w\ \Big(w-\frac{1}{2}\Big)^2\ b^2-\frac{13\ \Big(w^2-\frac{12}{13}\ w+\frac{5}{13}\Big)\ q\ z}{4}\Big)\ a$$

$$-2\ q\ \Big(\Big(w^2-\frac{1}{2}\ w\Big)\ b^2-2\ q\ z\Big)\ z\Big)\Big)\Big\}$$

```
> vars:={x,y,m,n};
```

$$vars := \{m,\ n,\ x,\ y\} \tag{18}$$

```
> solve(eqns,{x,y,m,n});
```

$$\Big\{m=-(3\ Y\ a^2\ b\ q\ w^3-2\ a^2\ b^2\ w^4-5\ Y\ a^2\ b\ q\ w^2-4\ w^3\ b\ a^3+a^2\ b^2\ w^3 \tag{19}$$

$$-2\ a^2\ b\ d\ w^3-2\ a\ b^3\ w^3+3\ Y\ a^2\ b\ q\ w-2\ Y\ a\ q^2\ w\ z+4\ w^2\ b\ a^3$$

$$-4\ a^2\ b^2\ w^2+a^2\ b\ d\ w^2+2\ a^2\ q\ w^2\ z+a\ b^3\ w^2-2\ a\ b^2\ d\ w^2-3\ a\ b\ c\ q\ w^2$$

$$+11\ a\ b\ q\ w^2\ z+q\ z\ b^2\ w^2-Y\ a^2\ b\ q+2\ Y\ a\ q^2\ z-w\ b\ a^3+4\ a^2\ b^2\ w$$

$$-a^2\ q\ w\ z+a\ b^2\ d\ w+2\ a\ b\ c\ q\ w-9\ a\ b\ q\ w\ z+2\ a\ d\ q\ w\ z+b\ d\ q\ w\ z$$

$$-a^2\ b^2-a\ b\ c\ q+4\ a\ b\ q\ z-a\ d\ q\ z+2\ c\ q^2\ z-4\ q^2\ z^2)\Big/(4\ a^2\ b^2\ w^4$$

$$+4\ w^3\ b\ a^3-4\ a^2\ b^2\ w^3+4\ a\ b^3\ w^3-4\ w^2\ b\ a^3+5\ a^2\ b^2\ w^2-2\ a^2\ q\ w^2\ z$$

$$-4\ a\ b^3\ w^2-13\ a\ b\ q\ w^2\ z-2\ q\ z\ b^2\ w^2+w\ b\ a^3-4\ a^2\ b^2\ w+a^2\ q\ w\ z$$

$$+a\ b^3\ w+12\ a\ b\ q\ w\ z+q\ z\ b^2\ w+a^2\ b^2-5\ a\ b\ q\ z+4\ q^2\ z^2),\ n$$

$$=(2\ Y\ a^2\ b^2\ w^4+2\ Y\ a^3\ b\ w^3-Y\ a^2\ b^2\ w^3+4\ Y\ a\ b^3\ w^3-Y\ a^3\ b\ w^2+4\ Y\ a^2\ b^2\ w^2$$

$$-Y\ a^2\ q\ w^2\ z-4\ Y\ a\ b^3\ w^2-11\ Y\ a\ b\ q\ w^2\ z-2\ Y\ b^2\ q\ w^2\ z+2\ a\ b^2\ c\ w^3$$

$$-3\ a\ b^2\ w^3\ z-4\ Y\ a^2\ b^2\ w+Y\ a\ b^3\ w+9\ Y\ a\ b\ q\ w\ z+Y\ b^2\ q\ w\ z$$

$$+2\,a^2\,b\,c\,w^2-a\,b^2\,c\,w^2+5\,a\,b^2\,w^2\,z+3\,a\,b\,d\,w^2\,z+Y\,a^2\,b^2-4\,Y\,a\,b\,q\,z$$

$$+4\,Y\,q^2\,z^2-a^2\,b\,c\,w-3\,a\,b^2\,w\,z-2\,a\,b\,d\,w\,z-a\,c\,q\,w\,z-2\,b\,c\,q\,w\,z$$

$$+2\,b\,q\,w\,z^2+a\,b^2\,z+a\,b\,d\,z+b\,c\,q\,z-2\,b\,q\,z^2-2\,d\,q\,z^2)\Big/(4\,a^2\,b^2\,w^4$$

$$+4\,w^3\,b\,a^3-4\,a^2\,b^2\,w^3+4\,a\,b^3\,w^3-4\,w^2\,b\,a^3+5\,a^2\,b^2\,w^2-2\,a^2\,q\,w^2\,z$$

$$-4\,a\,b^3\,w^2-13\,a\,b\,q\,w^2\,z-2\,q\,z\,b^2\,w^2+w\,b\,a^3-4\,a^2\,b^2\,w+a^2\,q\,w\,z$$

$$+a\,b^3\,w+12\,a\,b\,q\,w\,z+q\,z\,b^2\,w+a^2\,b^2-5\,a\,b\,q\,z+4\,q^2\,z^2),\ x$$

$$=(3\,Y\,a^2\,b\,q\,w^3+2\,a^2\,b^2\,w^4-5\,Y\,a^2\,b\,q\,w^2-3\,a^2\,b^2\,w^3-2\,a^2\,b\,d\,w^3$$

$$+2\,a\,b^3\,w^3+3\,Y\,a^2\,b\,q\,w-2\,Y\,a\,q^2\,w\,z+a^2\,b^2\,w^2+a^2\,b\,d\,w^2-3\,a\,b^3\,w^2$$

$$-2\,a\,b^2\,d\,w^2-3\,a\,b\,c\,q\,w^2-2\,a\,b\,q\,w^2\,z-q\,z\,b^2\,w^2-Y\,a^2\,b\,q$$

$$+2\,Y\,a\,q^2\,z+a\,b^3\,w+a\,b^2\,d\,w+2\,a\,b\,c\,q\,w+3\,a\,b\,q\,w\,z+2\,a\,d\,q\,w\,z$$

$$+q\,z\,b^2\,w+b\,d\,q\,w\,z-a\,b\,c\,q-a\,b\,q\,z-a\,d\,q\,z+2\,c\,q^2\,z)\Big/(4\,a^2\,b^2\,w^4$$

$$+4\,w^3\,b\,a^3-4\,a^2\,b^2\,w^3+4\,a\,b^3\,w^3-4\,w^2\,b\,a^3+5\,a^2\,b^2\,w^2-2\,a^2\,q\,w^2\,z$$

$$-4\,a\,b^3\,w^2-13\,a\,b\,q\,w^2\,z-2\,q\,z\,b^2\,w^2+w\,b\,a^3-4\,a^2\,b^2\,w+a^2\,q\,w\,z$$

$$+a\,b^3\,w+12\,a\,b\,q\,w\,z+q\,z\,b^2\,w+a^2\,b^2-5\,a\,b\,q\,z+4\,q^2\,z^2),\ y$$

$$=(2\,Y\,a^2\,b^2\,w^4+2\,Y\,a^3\,b\,w^3-3\,Y\,a^2\,b^2\,w^3-3\,Y\,a^3\,b\,w^2+Y\,a^2\,b^2\,w^2$$
$$-Y\,a^2\,q\,w^2\,z-2\,Y\,a\,b\,q\,w^2\,z-2\,a\,b^2\,c\,w^3+3\,a\,b^2\,w^3\,z+Y\,a^3\,b\,w$$
$$+Y\,a^2\,q\,w\,z+3\,Y\,a\,b\,q\,w\,z-2\,a^2\,b\,c\,w^2+a\,b^2\,c\,w^2-5\,a\,b^2\,w^2\,z$$
$$-3\,a\,b\,d\,w^2\,z-Y\,a\,b\,q\,z+a^2\,b\,c\,w+3\,a\,b^2\,w\,z+2\,a\,b\,d\,w\,z+a\,c\,q\,w\,z$$
$$+2\,b\,c\,q\,w\,z-2\,b\,q\,w\,z^2-a\,b^2\,z-a\,b\,d\,z-b\,c\,q\,z+2\,b\,q\,z^2$$
$$+2\,d\,q\,z^2)\Big/(4\,a^2\,b^2\,w^4+4\,w^3\,b\,a^3-4\,a^2\,b^2\,w^3+4\,a\,b^3\,w^3-4\,w^2\,b\,a^3$$
$$+5\,a^2\,b^2\,w^2-2\,a^2\,q\,w^2\,z-4\,a\,b^3\,w^2-13\,a\,b\,q\,w^2\,z-2\,q\,z\,b^2\,w^2+w\,b\,a^3$$
$$-4\,a^2\,b^2\,w+a^2\,q\,w\,z+a\,b^3\,w+12\,a\,b\,q\,w\,z+q\,z\,b^2\,w+a^2\,b^2-5\,a\,b\,q\,z$$
$$+4\,q^2\,z^2)\}$$

```
> map( simplify, (19) ) ;
```

$$\left\{ m = \left(4\ w\ b\ \left(w - \frac{1}{2} \right)^2\ a^3 + \left(\left(2\ w^4 - w^3 + 4\ w^2 - 4\ w + 1 \right)\ b^2 + \left(\left(-3\ q\ Y + 2\ d \right)\ w^3 \right. \right. \right. \tag{20}$$

$$\left. + \left(5\ q\ Y - d \right)\ w^2 - 3\ Y\ q\ w + q\ Y \right)\ b - 2\ q\ z\ \left(w - \frac{1}{2} \right)\ w \Bigg)\ a^2 + \left(\left(2\ w^3 - w^2 \right)\ b^3 \right.$$

$$+ 2\ d\ \left(w - \frac{1}{2} \right)\ w\ b^2 + 3\ q\ \left(\left(c - \frac{11\ z}{3} \right)\ w^2 + \left(-\frac{2\ c}{3} + 3\ z \right)\ w + \frac{c}{3} - \frac{4\ z}{3} \right)\ b$$

$$\left. + 2\ \left(\left(q\ Y - d \right)\ w - q\ Y + \frac{d}{2} \right)\ q\ z \right)\ a - q\ z\ \left(b^2\ w^2 + d\ w\ b + 2\ q\ \left(c - 2\ z \right) \right) \Bigg)$$

$$\Big/ \left(4\ w\ b\ \left(w - \frac{1}{2} \right)^2\ a^3 + 4\ \left(\left(w^2 + 1 \right)\ \left(w - \frac{1}{2} \right)\ b^2 - \frac{q\ w\ z}{2} \right)\ \left(w - \frac{1}{2} \right)\ a^2 \right.$$

$$+ 4\ b\ \left(w\ \left(w - \frac{1}{2} \right)^2\ b^2 - \frac{13\ \left(w^2 - \frac{12}{13}\ w + \frac{5}{13} \right)\ q\ z}{4} \right)\ a - 2\ q\ \left(\left(w^2 - \frac{1}{2}\ w \right)\ b^2 \right.$$

$$\left. \left. - 2\ q\ z \right)\ z \right), \ n = \left(4\ a\ Y\ \left(w - \frac{1}{2} \right)^2\ w\ b^3 + \left(2\ Y\ \left(w^3 + 2\ w - 1 \right)\ \left(w - \frac{1}{2} \right)\ a^2 \right. \right.$$

$$\left. + \left(\left(2\ c - 3\ z \right)\ w^3 + \left(-c + 5\ z \right)\ w^2 - 3\ w\ z + z \right)\ a - 2\ Y\ q\ z\ \left(w - \frac{1}{2} \right)\ w \right)\ b^2$$

$$+\left(2\ Y\left(w-\frac{1}{2}\right)\ w^2\ a^3+2\ c\left(w-\frac{1}{2}\right)\ w\ a^2-11\ z\left(\left(q\ Y-\frac{3\ d}{11}\right)\ w^2+\left(\right.\right.\right.$$

$$\left.\left.\left.-\frac{9\ q\ Y}{11}+\frac{2\ d}{11}\right)\ w+\frac{4\ q\ Y}{11}-\frac{d}{11}\right)\ a-2\ q\left((c-z)\ w-\frac{c}{2}+z\right)\ z\right)\ b$$

$$-\left(Y\ a^2\ w^2+c\ w\ a-4\left(q\ Y-\frac{d}{2}\right)\ z\right)\ q\ z\Bigg)\Bigg/\left(4\ w\ a\left(w-\frac{1}{2}\right)^2\ b^3+4\left(\left(w^2\right.\right.\right.$$

$$\left.\left.\left.+1\right)\left(w-\frac{1}{2}\right)\ a^2-\frac{q\ w\ z}{2}\right)\left(w-\frac{1}{2}\right)\ b^2+4\left(w\left(w-\frac{1}{2}\right)^2\ a^2\right.\right.$$

$$\left.\left.-\frac{13\left(w^2-\frac{12}{13}\ w+\frac{5}{13}\right)\ q\ z}{4}\right)\ a\ b-2\left(\left(w^2-\frac{1}{2}\ w\right)\ a^2-2\ q\ z\right)\ q\ z\right),\ x$$

$$=\left(3\left(\left(\frac{2}{3}\ w^4-w^3+\frac{1}{3}\ w^2\right)\ b+\left(q\ Y-\frac{2\ d}{3}\right)\ w^3+\left(-\frac{5\ q\ Y}{3}+\frac{d}{3}\right)\ w^2+Y\ q\ w\right.\right.$$

$$\left.\left.-\frac{q\ Y}{3}\right)\ b\ a^2+\left(\left(2\ w^3-3\ w^2+w\right)\ b^3-2\ d\left(w-\frac{1}{2}\right)\ w\ b^2-3\ q\left(\left(c\right.\right.\right.\right.$$

$$\left.\left.\left.\left.+\frac{2\ z}{3}\right)\ w^2+\left(-\frac{2\ c}{3}-z\right)\ w+\frac{c}{3}+\frac{z}{3}\right)\ b-2\left((q\ Y-d)\ w-q\ Y+\frac{d}{2}\right)\ q\ z\right)\ a$$

$$-\left(\left(w^2-w\right)\ b^2-d\ w\ b-2\ c\ q\right)\ q\ z\Big)\Big/\left(4\ w\ b\ \left(w-\frac{1}{2}\right)^2\ a^3+4\ \left(\left(w^2\right.\right.\right.$$

$$\left.\left.\left.+1\right)\ \left(w-\frac{1}{2}\right)\ b^2-\frac{q\ w\ z}{2}\right)\ \left(w-\frac{1}{2}\right)\ a^2+4\ b\ \left(w\ \left(w-\frac{1}{2}\right)^2\ b^2\right.\right.$$

$$\left.\left.-\frac{13\ \left(w^2-\frac{12}{13}\ w+\frac{5}{13}\right)\ q\ z}{4}\right)\ a-2\ q\ \left(\left(w^2-\frac{1}{2}\ w\right)\ b^2-2\ q\ z\right)\ z\right),\ y$$

$$=\left(2\ a\ \left(\left(w-1\right)\ Y\ \left(w-\frac{1}{2}\right)\ w^2\ a+\left(-c+\frac{3\ z}{2}\right)\ w^3+\left(\frac{c}{2}-\frac{5\ z}{2}\right)\ w^2+\frac{3\ w\ z}{2}\right.\right.$$

$$\left.\left.-\frac{z}{2}\right)\ b^2+\left(2\ \left(w-1\right)\ Y\ \left(w-\frac{1}{2}\right)\ w\ a^3-2\ c\ \left(w-\frac{1}{2}\right)\ w\ a^2-2\ z\ \left(\left(q\ Y\right.\right.\right.$$

$$\left.\left.\left.+\frac{3\ d}{2}\right)\ w^2+\left(-\frac{3\ q\ Y}{2}-d\right)\ w+\frac{q\ Y}{2}+\frac{d}{2}\right)\ a+2\ q\ \left(\left(c-z\right)\ w-\frac{c}{2}+z\right)\ z\right)\ b$$

$$-\left(w\ Y\ \left(w-1\right)\ a^2-c\ w\ a-2\ d\ z\right)\ q\ z\Big)\Big/\left(4\ w\ a\ \left(w-\frac{1}{2}\right)^2\ b^3+4\ \left(\left(w^2\right.\right.\right.$$

$$\left.\left.\left.+1\right)\ \left(w-\frac{1}{2}\right)\ a^2-\frac{q\ w\ z}{2}\right)\ \left(w-\frac{1}{2}\right)\ b^2+4\ \left(w\ \left(w-\frac{1}{2}\right)^2\ a^2\right.\right.$$

$$\left.\left.\left.-\frac{13\ \left(w^2-\frac{12}{13}\ w+\frac{5}{13}\right)\ q\ z}{4}\right)\ a\ b-2\ \left(\left(w^2-\frac{1}{2}\ w\right)\ a^2-2\ q\ z\right)\ q\ z\right)\right\}$$

```
> subs(a=0.6,b=1.5,z=1.9,q=2,c=1.6,d=1.6,Y=1,x = (3*((2/3*w^4 - w^3 + 1/3*
  w^2)*b + (Y*q - (2*d)/3)*w^3 + (-(5*Y*q)/3 + d/3)*w^2 + Y*q*w - Y*q/3)*b*
  a^2 + ((2*w^3 - 3*w^2 + w)*b^3 - 2*d*(w - 1/2)*w*b^2 - 3*q*((c + (2*z)/3)*
  w^2 + (-(2*c)/3 - z)*w + c/3 + z/3)*b - 2*((Y*q - d)*w - Y*q + d/2)*q*z)*a
  - ((w^2 - w)*b^2 - d*w*b - 2*c*q)*q*z)/(4*w*b*(w - 1/2)^2*a^3 + 4*((w^2 +
  1)*(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*b^2 - 13*
  (w^2 - 12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*z));
```

$$x=\left(1.620000000\ w^4+3.131999999\ w^3-33.83100000\ w^2+37.13100000\ w\right.$$ **(21)**

$$+ 22.41200000 - 4.3200 \left(w - \frac{1}{2}\right) w \Big) \Big/ \Big(9.3960\ w \left(w - \frac{1}{2}\right)^2 + 1.44 \Big(2.25\ (w^2 + 1) \left(w - \frac{1}{2}\right) - 1.900000000\ w \Big) \left(w - \frac{1}{2}\right) - 61.56000000\ w^2 + 49.59000000\ w + 40.66000000 \Big)$$

```
> simplify((21))
```

$$x = \frac{40.50\ w^4 + 78.29999998\ w^3 - 953.775\ w^2 + 982.275\ w + 560.300}{153.9\ w^3 - 1741.05\ w^2 + 1251.675\ w + 81.\ w^4 + 1036.75} \tag{22}$$

```
> subs(a=0.6,b=1.5,z=1.9,q=2,c=1.6,d=1.6,Y=1,y = (2*a*((w - 1)*Y*(w - 1/2)*
  w^2*a + (-c + (3*z)/2)*w^3 + (c/2 - (5*z)/2)*w^2 + (3*w*z)/2 - z/2)*b^2 +
  (2*(w - 1)*Y*(w - 1/2)*w*a^3 - 2*c*(w - 1/2)*w*a^2 - 2*z*((Y*q + (3*d)/2)*
  w^2 + (-(3*Y*q)/2 - d)*w + Y*q/2 + d/2)*a + 2*q*((c - z)*w - c/2 + z)*z)*b
  - (w*Y*(w - 1)*a^2 - c*w*a - 2*d*z)*q*z)/(4*w*a*(w - 1/2)^2*b^3 + 4*((w^2 +
  1)*(w - 1/2)*a^2 - q*w*z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2 - 13*(w^2
  - 12/13*w + 5/13)*q*z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*z*q)*q*z));
```

$$y = \Big(1.6200\ (w - 1) \left(w - \frac{1}{2}\right) w^2 + 3.375000000\ w^3 - 25.71300000\ w^2 + 23.65500000\ w + 26.92300000 + 0.6480\ (w - 1) \left(w - \frac{1}{2}\right) w - 1.7280 \Big(w - \frac{1}{2}\Big) w - 1.368\ w\ (w - 1)\Big) \Big/ \Big(9.3960\ w \left(w - \frac{1}{2}\right)^2 + 9.00 \Big(0.36\ (w^2 + 1) \Big(w - \frac{1}{2}\Big) - 1.900000000\ w \Big) \left(w - \frac{1}{2}\right) - 47.19600000\ w^2 + 42.40800000\ w + 40.66000000 \Big) \tag{23}$$

```
> simplify((23))
```

$$y = \frac{1.62\ w^4 + 1.593\ w^3 - 28.971\ w^2 + 26.211\ w + 26.923}{6.156\ w^3 - 69.642\ w^2 + 50.067\ w + 3.24\ w^4 + 41.47} \tag{24}$$

```
> subs(a=0.6,b=1.5,z=1.9,q=2,c=1.6,d=1.6,Y=1,Pi=(-4*(Y*(w - 1/2)*(w - 1)*a +
  (-c + z/2)*w + c/2 - z/2)*w*a*(w - 1/2)*b^3 + (-4*(w - 1)*Y*(w - 1/2)^2*a^3
  + 4*(w^3*z - 2*w^2*z + (c + (3*z)/2)*w - c/2 - z/2)*(w - 1/2)*a^2 + 2*(Y*q*
  w - Y*q + d)*w*z*(w - 1/2)*a - 2*((c - z/2)*w - c/2 + z/2)*w*q*z)*b^2 + 6*(
  (w^2 - w + 1/2)*((Y*q - (2*d)/3)*w - Y*q + d/3)*a^2 - ((c + z/3)*w^2 + (-c
  - z/2)*w + c/2 + z/6)*q*a - d*q*w*z/6)*z*b - 2*(((Y*q - d)*w - Y*q + d/2)*a
  - c*q)*q*z^2)/(4*w*a*(w - 1/2)^2*b^3 + 4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*
  z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2 - 13*(w^2 - 12/13*w + 5/13)*q*
  z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*z*q)*q*z)*(3*((2/3*w^4 - w^3 + 1/3*w^2)
  *b + (Y*q - (2*d)/3)*w^3 + (-(5*Y*q)/3 + d/3)*w^2 + Y*q*w - Y*q/3)*b*a^2 +
  ((2*w^3 - 3*w^2 + w)*b^3 - 2*d*(w - 1/2)*w*b^2 - 3*q*((c + (2*z)/3)*w^2 +
  (-(2*c)/3 - z)*w + c/3 + z/3)*b - 2*((Y*q - d)*w - Y*q + d/2)*q*z)*a - (
  (w^2 - w)*b^2 - d*w*b - 2*c*q)*q*z)/(4*w*b*(w - 1/2)^2*a^3 + 4*((w^2 + 1)*
  (w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*b^2 - 13*(w^2 -
```

12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*z)+(-2*((2*w^2 - 3*w + 1)*b + (Y*q - 2*d)*w - Y*q + d)*w*b*(w - 1/2)*a^3 + ((-4*w^3 + 8*w^2 - 5*w + 1)*b^3 + 4*(Y*q*w^3 - 2*Y*q*w^2 + ((3*Y*q)/2 + d)*w - Y*q/2 - d/2)*(w - 1/2)*b^2 + 2*(w*z + c - z)*w*q*(w - 1/2)*b + w*q*((Y*q - 2*d)*w - Y*q + d)*z)*a^2 - 2*q*(2*(w^2 - w + 1/2)*((c - (3*z)/2)*w - c/2 + (3*z)/2)*b^2 + ((Y*q + 3*d)*w^2 + (-(3*Y*q)/2 - 3*d)*w + Y*q/2 + (3*d)/2)*z*b + c*q*w*z/2)*a + 2*q^2*(((c - z)*w - c/2 + z)*b + d*z)*z)/(4*w*b*(w - 1/2)^2*a^3 + 4*((w^2 + 1)*(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*b^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*z)*(2*a*((w - 1)*Y*(w - 1/2)*w^2*a + (-c + (3*z)/2)*w^3 + (c/2 - (5*z)/2)*w^2 + (3*w*z)/2 - z/2)*b^2 + (2*(w - 1)*Y*(w - 1/2)*w*a^3 - 2*c*(w - 1/2)*w*a^2 - 2*z*((Y*q + (3*d)/2)*w^2 + (-(3*Y*q)/2 - d)*w + Y*q/2 + d/2)*a + 2*q*((c - z)*w - c/2 + z)*z)*b - (w*Y*(w - 1)*a^2 - c*w*a - 2*d*z)*q*z)/(4*w*a*(w - 1/2)^2*b^3 + 4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*z*q)*q*z));

$$\pi = \left(\left(-8.1000\left(0.6\left(w-\frac{1}{2}\right)(w-1)-0.6500000000\,w-0.1500000000\right)w\left(w-\frac{1}{2}\right)-1.94400\,(w-1)\left(w-\frac{1}{2}\right)^2+3.2400\,(1.9\,w^3-3.8\,w^2+4.450000000\,w-1.750000000)\left(w-\frac{1}{2}\right)+5.1300\,(2\,w-0.4)\,w\left(w-\frac{1}{2}\right)-17.100\,(0.6500000000\,w+0.1500000000)\,w+6.1560\left(w^2-w+\frac{1}{2}\right)(0.933333333\,w-1.466666667)-45.82799999\,w^2+31.53240000\,w+33.69080000\right)\left(1.620000000\,w^4+3.131999999\,w^3-33.83100000\,w^2+37.13100000\,w+22.41200000-4.3200\left(w-\frac{1}{2}\right)w\right)\right)\Big/\left(\left(9.3960\,w\left(w-\frac{1}{2}\right)^2+9.00\left(0.36\,(w^2+1)\left(w-\frac{1}{2}\right)-1.900000000\,w\right)\left(w-\frac{1}{2}\right)-47.19600000\,w^2+42.40800000\,w+40.66000000\right)\left(9.3960\,w\left(w-\frac{1}{2}\right)^2+1.44\left(2.25\,(w^2+1)\left(w-\frac{1}{2}\right)-1.900000000\,w\right)\left(w-\frac{1}{2}\right)-61.56000000\,w^2+49.59000000\,w+40.66000000\right)\right)+\left(\left(-0.6480\,(3.0\,w^2-5.7\,w+1.1)\,w\left(w-\frac{1}{2}\right)-4.86000\,w^3-36.79200\,w^2+33.14100000\,w+49.24700000+3.2400\,(2\,w^3-4\,w^2+4.6\,w-1.800000000)\left(w-\frac{1}{2}\right)+2.160\,(-0.3+1.9\,w)\,w\left(w-\frac{1}{2}\right)\right.\right. \tag{25}$$

$$+ 1.368\ w\ (-1.2\ w - 0.4) - 10.800\left(w^2 - w + \frac{1}{2}\right)(-1.250000000\ w + 2.050000000)\Big)\left(1.6200\ (w-1)\left(w - \frac{1}{2}\right)w^2 + 3.375000000\ w^3 - 25.71300000\ w^2 + 23.65500000\ w + 26.92300000 + 0.6480\ (w-1)\left(w - \frac{1}{2}\right)w - 1.7280\left(w - \frac{1}{2}\right)w - 1.368\ w\ (w-1)\right)\Big)\Big/\Big(\Big(9.3960\ w\left(w - \frac{1}{2}\right)^2 + 1.44\left(2.25\ (w^2+1)\left(w - \frac{1}{2}\right) - 1.900000000\ w\right)\left(w - \frac{1}{2}\right) - 61.56000000\ w^2 + 49.59000000\ w + 40.66000000\Big)\left(9.3960\ w\left(w - \frac{1}{2}\right)^2 + 9.00\left(0.36\ (w^2+1)\left(w - \frac{1}{2}\right) - 1.900000000\ w\right)\left(w - \frac{1}{2}\right) - 47.19600000\ w^2 + 42.40800000\ w + 40.66000000\right)\Big)$$

> simplify((25))

$$\pi = (4279.406313\ w + 5043.241514\ w^4 - 5899.880888\ w^3 - 3028.794111\ w^2 + 1834.678568 + 9.44784\ w^8 + 35.368164\ w^7 - 330.36093\ w^6 - 549.2801645\ w^5)\Big/(6.156\ w^3 - 69.642\ w^2 + 50.067\ w + 3.24\ w^4 + 41.47)^2 \quad (26)$$

```
> subs(a=1.5,b=0.6,z=1.9,q=2,c=1.6,d=1.6,Y=1,x = (3*((2/3*w^4 - w^3 + 1/3*
  w^2)*b + (Y*q - (2*d)/3)*w^3 + (-(5*Y*q)/3 + d/3)*w^2 + Y*q*w - Y*q/3)*b*
  a^2 + ((2*w^3 - 3*w^2 + w)*b^3 - 2*d*(w - 1/2)*w*b^2 - 3*q*((c + (2*z)/3)*
  w^2 + (-(2*c)/3 - z)*w + c/3 + z/3)*b - 2*((Y*q - d)*w - Y*q + d/2)*q*z)*a
  - ((w^2 - w)*b^2 - d*w*b - 2*c*q)*q*z)/(4*w*b*(w - 1/2)^2*a^3 + 4*((w^2 +
  1)*(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*b^2 - 13*
  (w^2 - 12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*z));
```

$$x = \left(1.620000000\ w^4 + 1.997999999\ w^3 - 28.35000000\ w^2 + 24.90000000\ w + 29.00000000 - 1.7280\left(w - \frac{1}{2}\right)w\right)\Big/\left(9.3960\ w\left(w - \frac{1}{2}\right)^2 + 9.00\left(0.36\ (w^2+1)\left(w - \frac{1}{2}\right) - 1.900000000\ w\right)\left(w - \frac{1}{2}\right) - 47.19600000\ w^2 + 42.40800000\ w + 40.66000000\right) \quad (27)$$

> simplify((27))

$$x = \frac{40.50\ w^4 + 49.94999998\ w^3 - 751.950\ w^2 + 644.100\ w + 725.}{153.9\ w^3 - 1741.05\ w^2 + 1251.675\ w + 81.\ w^4 + 1036.75} \quad (28)$$

```
> subs(a=1.5,b=0.6,z=1.9,q=2,c=1.6,d=1.6,Y=1,y = (2*a*((w - 1)*Y*(w - 1/2)*
  w^2*a + (-c + (3*z)/2)*w^3 + (c/2 - (5*z)/2)*w^2 + (3*w*z)/2 - z/2)*b^2 +
```

```
(2*(w - 1)*Y*(w - 1/2)*w*a^3 - 2*c*(w - 1/2)*w*a^2 - 2*z*((Y*q + (3*d)/2)*
w^2 + (-(3*Y*q)/2 - d)*w + Y*q/2 + d/2)*a + 2*q*((c - z)*w - c/2 + z)*z)*b
- (w*Y*(w - 1)*a^2 - c*w*a - 2*d*z)*q*z)/(4*w*a*(w - 1/2)^2*b^3 + 4*((w^2 +
1)*(w - 1/2)*a^2 - q*w*z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2 - 13*(w^2
- 12/13*w + 5/13)*q*z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*z*q)*q*z));
```

$$y = \left(1.6200\ (w-1)\left(w-\frac{1}{2}\right)w^2 + 1.350000000\ w^3 - 19.31400000\ w^2 + 26.56200000\ w + 20.93800000 + 4.0500\ (w-1)\left(w-\frac{1}{2}\right)w - 4.3200\left(w-\frac{1}{2}\right)w - 8.550\ w\ (w-1)\right) \Big/ \left(9.3960\ w\left(w-\frac{1}{2}\right)^2 + 1.44\left(2.25\ (w^2+1)\left(w-\frac{1}{2}\right) - 1.900000000\ w\right)\left(w-\frac{1}{2}\right) - 61.56000000\ w^2 + 49.59000000\ w + 40.66000000\right) \tag{29}$$

```
> simplify( (29) )
```

$$y = \frac{1.62\ w^4 + 2.97\ w^3 - 37.449\ w^2 + 39.297\ w + 20.938}{6.156\ w^3 - 69.642\ w^2 + 50.067\ w + 3.24\ w^4 + 41.47} \tag{30}$$

```
> subs(a=1.5,b=0.6,z=1.9,q=2,c=1.6,d=1.6,Y=1,Pi=(-4*(Y*(w - 1/2)*(w - 1)*a +
(-c + z/2)*w + c/2 - z/2)*w*a*(w - 1/2)*b^3 + (-4*(w - 1)*Y*(w - 1/2)^2*a^3
+ 4*(w^3*z - 2*w^2*z + (c + (3*z)/2)*w - c/2 - z/2)*(w - 1/2)*a^2 + 2*(Y*q*
w - Y*q + d)*w*z*(w - 1/2)*a - 2*((c - z/2)*w - c/2 + z/2)*w*q*z)*b^2 + 6*(
(w^2 - w + 1/2)*((Y*q - (2*d)/3)*w - Y*q + d/3)*a^2 - ((c + z/3)*w^2 + (-c
- z/2)*w + c/2 + z/6)*q*a - d*q*w*z/6)*z*b - 2*(((Y*q - d)*w - Y*q + d/2)*a
- c*q)*q*z^2)/(4*w*a*(w - 1/2)^2*b^3 + 4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*
z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2 - 13*(w^2 - 12/13*w + 5/13)*q*
z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*z*q)*q*z)*(3*((2/3*w^4 - w^3 + 1/3*w^2)
*b + (Y*q - (2*d)/3)*w^3 + (-(5*Y*q)/3 + d/3)*w^2 + Y*q*w - Y*q/3)*b*a^2 +
((2*w^3 - 3*w^2 + w)*b^3 - 2*d*(w - 1/2)*w*b^2 - 3*q*((c + (2*z)/3)*w^2 +
(-(2*c)/3 - z)*w + c/3 + z/3)*b - 2*((Y*q - d)*w - Y*q + d/2)*q*z)*a - (
(w^2 - w)*b^2 - d*w*b - 2*c*q)*q*z)/(4*w*b*(w - 1/2)^2*a^3 + 4*((w^2 + 1)*
(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*b^2 - 13*(w^2 -
12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*z)+(-2*((2*w^2 -
3*w + 1)*b + (Y*q - 2*d)*w - Y*q + d)*w*b*(w - 1/2)*a^3 + ((-4*w^3 + 8*w^2
- 5*w + 1)*b^3 + 4*(Y*q*w^3 - 2*Y*q*w^2 + ((3*Y*q)/2 + d)*w - Y*q/2 - d/2)*
(w - 1/2)*b^2 + 2*(w*z + c - z)*w*q*(w - 1/2)*b + w*q*((Y*q - 2*d)*w - Y*q
+ d)*z)*a^2 - 2*q*(2*(w^2 - w + 1/2)*((c - (3*z)/2)*w - c/2 + (3*z)/2)*b^2
+ ((Y*q + 3*d)*w^2 + (-(3*Y*q)/2 - 3*d)*w + Y*q/2 + (3*d)/2)*z*b + c*q*w*
z/2)*a + 2*q^2*(((c - z)*w - c/2 + z)*b + d*z)*z)/(4*w*b*(w - 1/2)^2*a^3 +
4*((w^2 + 1)*(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*
b^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*
z)*(2*a*((w - 1)*Y*(w - 1/2)*w^2*a + (-c + (3*z)/2)*w^3 + (c/2 - (5*z)/2)*
w^2 + (3*w*z)/2 - z/2)*b^2 + (2*(w - 1)*Y*(w - 1/2)*w*a^3 - 2*c*(w - 1/2)*
w*a^2 - 2*z*((Y*q + (3*d)/2)*w^2 + (-(3*Y*q)/2 - d)*w + Y*q/2 + d/2)*a + 2*
q*((c - z)*w - c/2 + z)*z)*b - (w*Y*(w - 1)*a^2 - c*w*a - 2*d*z)*q*z)/(4*w*
```

```
a*(w - 1/2)^2*b^3 + 4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*z/2)*(w - 1/2)*b^2 +
4*(w*(w - 1/2)^2*a^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a*b - 2*((w^2 -
1/2*w)*a^2 - 2*z*q)*q*z));
```

$$\pi = \left(\left(-1.2960\left(1.5\left(w-\frac{1}{2}\right)(w-1)-0.6500000000\,w-0.1500000000\right)w\left(w-\frac{1}{2}\right)-4.86000(w-1)\left(w-\frac{1}{2}\right)^2+3.2400(1.9\,w^3-3.8\,w^2+4.450000000\,w-1.750000000)\left(w-\frac{1}{2}\right)+2.0520(2\,w-0.4)\,w\left(w-\frac{1}{2}\right)-2.736(0.6500000000\,w+0.1500000000)\,w+15.3900\left(w^2-w+\frac{1}{2}\right)(0.933333333\,w-1.466666667)-45.82799999\,w^2+36.73080000\,w+49.28600000\right)\left(1.620000000\,w^4+1.997999999\,w^3-28.35000000\,w^2+24.90000000\,w+29.00000000-1.7280\left(w-\frac{1}{2}\right)w\right)\right)\Big/\left(\left(9.3960\,w\left(w-\frac{1}{2}\right)^2+1.44\left(2.25(w^2+1)\left(w-\frac{1}{2}\right)-1.900000000\,w\right)\left(w-\frac{1}{2}\right)-61.56000000\,w^2+49.59000000\,w+40.66000000\right)\left(9.3960\,w\left(w-\frac{1}{2}\right)^2+9.00\left(0.36(w^2+1)\left(w-\frac{1}{2}\right)-1.900000000\,w\right)\left(w-\frac{1}{2}\right)-47.19600000\,w^2+42.40800000\,w+40.66000000\right)\right)+\left(\left(-4.0500(1.2\,w^2-3.0\,w+0.2)\,w\left(w-\frac{1}{2}\right)-1.94400\,w^3-42.62400\,w^2+29.94600000\,w+33.47000000+3.2400(2\,w^3-4\,w^2+4.6\,w-1.800000000)\left(w-\frac{1}{2}\right)+5.400(-0.3+1.9\,w)\,w\left(w-\frac{1}{2}\right)+8.550\,w(-1.2\,w-0.4)-4.320\left(w^2-w+\frac{1}{2}\right)(-1.250000000\,w+2.050000000)\right)\left(1.6200(w-1)\left(w-\frac{1}{2}\right)w^2+1.350000000\,w^3-19.31400000\,w^2+26.56200000\,w+20.93800000+4.0500(w-1)\left(w-\frac{1}{2}\right)w-4.3200\left(w-\frac{1}{2}\right)w-8.550\,w(w-1)\right)\right)\Big/\left(\left(9.3960\,w\left(w-\frac{1}{2}\right)^2+9.00\left(0.36(w^2+1)\left(w-\frac{1}{2}\right)-1.900000000\,w\right)\left(w-\frac{1}{2}\right)-47.19600000\,w^2\right. \tag{31}$$

$$+ 42.40800000\ w + 40.66000000\Big)\ \Big(9.3960\ w\ \Big(w - \frac{1}{2}\Big)^2 + 1.44\ \Big(2.25\ (w^2 + 1)\ \Big(w - \frac{1}{2}\Big) - 1.900000000\ w\Big)\ \Big(w - \frac{1}{2}\Big) - 61.56000000\ w^2 + 49.59000000\ w + 40.66000000\Big)\Big)$$

> *simplify*((31))

$$\pi = (4273.55832\ w + 5022.397823\ w^4 - 5771.794277\ w^3 - 3181.832364\ w^2 + 9.44784\ w^8 + 37.59890398\ w^7 - 338.5936728\ w^6 - 545.5428728\ w^5 + 1888.586604) / (6.156\ w^3 - 69.642\ w^2 + 50.067\ w + 3.24\ w^4 + 41.47)^2 \quad (32)$$

```
> subs(a=1.1,b=0.9,z=1.9,q=2,c=1.6,d=1.6,Y=1,p = (-4*(Y*(w - 1/2)*(w - 1)*a
  + (-c + z/2)*w + c/2 - z/2)*w*a*(w - 1/2)*b^3 + (-4*(w - 1)*Y*(w - 1/2)^2*
  a^3 + 4*(w^3*z - 2*w^2*z + (c + (3*z)/2)*w - c/2 - z/2)*(w - 1/2)*a^2 + 2*
  (Y*q*w - Y*q + d)*w*z*(w - 1/2)*a - 2*((c - z/2)*w - c/2 + z/2)*w*q*z)*b^2
  + 6*((w^2 - w + 1/2)*((Y*q - (2*d)/3)*w - Y*q + d/3)*a^2 - ((c + z/3)*w^2 +
  (-c - z/2)*w + c/2 + z/6)*q*a - d*q*w*z/6)*z*b - 2*(((Y*q - d)*w - Y*q +
  d/2)*a - c*q)*q*z^2)/(4*w*a*(w - 1/2)^2*b^3 + 4*((w^2 + 1)*(w - 1/2)*a^2 -
  q*w*z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2 - 13*(w^2 - 12/13*w + 5/13)*
  q*z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*z*q)*q*z));
```

$$p = \Big(-3.2076\ \Big(1.1\ \Big(w - \frac{1}{2}\Big)\ (w - 1) - 0.6500000000\ w - 0.1500000000\Big)\ w\ \Big(w - \frac{1}{2}\Big) - 4.31244\ (w - 1)\ \Big(w - \frac{1}{2}\Big)^2 + 3.9204\ (1.9\ w^3 - 3.8\ w^2 + 4.450000000\ w - 1.750000000)\ \Big(w - \frac{1}{2}\Big) + 3.3858\ (2\ w - 0.4)\ w\ \Big(w - \frac{1}{2}\Big) - 6.156\ (0.6500000000\ w + 0.1500000000)\ w + 12.4146\ \Big(w^2 - w + \frac{1}{2}\Big)\ (0.933333333\ w - 1.466666667) - 50.41079999\ w^2 + 40.80820000\ w + 40.06340000\Big) \Big/ \Big(7.9992\ w\ \Big(w - \frac{1}{2}\Big)^2 + 3.24\ \Big(1.21\ (w^2 + 1)\ \Big(w - \frac{1}{2}\Big) - 1.900000000\ w\Big)\ \Big(w - \frac{1}{2}\Big) - 58.10200000\ w^2 + 49.74200000\ w + 38.95000000\Big) \quad (33)$$

> *simplify*((33))

$$p = \frac{3.9204\ w^4 + 4.56588\ w^3 - 60.39971999\ w^2 + 44.23090001\ w + 35.46782}{4.0788\ w^3 - 67.3567\ w^2 + 50.8994\ w + 3.9204\ w^4 + 39.9301} \quad (34)$$

```
> subs(a=1.1,b=0.9,z=1.9,q=2,c=1.6,d=1.6,Y=1,r = (-2*((2*w^2 - 3*w + 1)*b +
  (Y*q - 2*d)*w - Y*q + d)*w*b*(w - 1/2)*a^3 + ((-4*w^3 + 8*w^2 - 5*w + 1)*
  b^3 + 4*(Y*q*w^3 - 2*Y*q*w^2 + ((3*Y*q)/2 + d)*w - Y*q/2 - d/2)*(w - 1/2)*
  b^2 + 2*(w*z + c - z)*w*q*(w - 1/2)*b + w*q*((Y*q - 2*d)*w - Y*q + d)*z)*
  a^2 - 2*q*(2*(w^2 - w + 1/2)*((c - (3*z)/2)*w - c/2 + (3*z)/2)*b^2 + ((Y*q
```

```
+ 3*d)*w^2 + (-(3*Y*q)/2 - 3*d)*w + Y*q/2 + (3*d)/2)*z*b + c*q*w*z/2)*a +
2*q^2*(((c - z)*w - c/2 + z)*b + d*z)*z)/(4*w*b*(w - 1/2)^2*a^3 + 4*((w^2 +
1)*(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*b^2 - 13*
(w^2 - 12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*z));
```

$$r = \left(-2.3958\ (1.8\ w^2 - 3.9\ w + 0.5)\ w\ \left(w - \frac{1}{2}\right) - 3.52836\ w^3 - 44.10648\ w^2 \right. \tag{35}$$

$$+ 36.79675000\ w + 36.55649000 + 3.9204\ (2\ w^3 - 4\ w^2 + 4.6\ w$$

$$- 1.800000000)\ \left(w - \frac{1}{2}\right) + 4.356\ (-0.3 + 1.9\ w)\ w\ \left(w - \frac{1}{2}\right) + 4.598\ w\ ($$

$$\left. -1.2\ w - 0.4) - 7.128\ \left(w^2 - w + \frac{1}{2}\right)\ (-1.250000000\ w + 2.050000000)\right) \Big/$$

$$\left(7.9992\ w\ \left(w - \frac{1}{2}\right)^2 + 4.84\ \left(0.81\ (w^2 + 1)\ \left(w - \frac{1}{2}\right) - 1.900000000\ w\right)\ \left(w\right.\right.$$

$$\left.\left. - \frac{1}{2}\right) - 55.06200000\ w^2 + 48.22200000\ w + 38.95000000\right)$$

```
> simplify( (35) )
```

$$r = \frac{3.52836\ w^4 + 5.55588\ w^3 - 58.58655\ w^2 + 39.20366\ w + 32.77865}{4.0788\ w^3 - 67.3567\ w^2 + 50.8994\ w + 3.9204\ w^4 + 39.9301} \tag{36}$$

```
> subs(a=1.1,b=0.9,z=1.9,q=2,c=1.6,d=1.6,Y=1,Pi=(-4*(Y*(w - 1/2)*(w - 1)*a +
(-c + z/2)*w + c/2 - z/2)*w*a*(w - 1/2)*b^3 + (-4*(w - 1)*Y*(w - 1/2)^2*a^3
+ 4*(w^3*z - 2*w^2*z + (c + (3*z)/2)*w - c/2 - z/2)*(w - 1/2)*a^2 + 2*(Y*q*
w - Y*q + d)*w*z*(w - 1/2)*a - 2*((c - z/2)*w - c/2 + z/2)*w*q*z)*b^2 + 6*(
(w^2 - w + 1/2)*((Y*q - (2*d)/3)*w - Y*q + d/3)*a^2 - ((c + z/3)*w^2 + (-c
- z/2)*w + c/2 + z/6)*q*a - d*q*w*z/6)*z*b - 2*(((Y*q - d)*w - Y*q + d/2)*a
- c*q)*q*z^2)/(4*w*a*(w - 1/2)^2*b^3 + 4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*
z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2 - 13*(w^2 - 12/13*w + 5/13)*q*
z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*z*q)*q*z)*(3*((2/3*w^4 - w^3 + 1/3*w^2)
*b + (Y*q - (2*d)/3)*w^3 + (-(5*Y*q)/3 + d/3)*w^2 + Y*q*w - Y*q/3)*b*a^2 +
((2*w^3 - 3*w^2 + w)*b^3 - 2*d*(w - 1/2)*w*b^2 - 3*q*((c + (2*z)/3)*w^2 +
(-(2*c)/3 - z)*w + c/3 + z/3)*b - 2*((Y*q - d)*w - Y*q + d/2)*q*z)*a - (
(w^2 - w)*b^2 - d*w*b - 2*c*q)*q*z)/(4*w*b*(w - 1/2)^2*a^3 + 4*((w^2 + 1)*
(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*b^2 - 13*(w^2 -
12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*z)+(-2*((2*w^2 -
3*w + 1)*b + (Y*q - 2*d)*w - Y*q + d)*w*b*(w - 1/2)*a^3 + ((-4*w^3 + 8*w^2
- 5*w + 1)*b^3 + 4*(Y*q*w^3 - 2*Y*q*w^2 + ((3*Y*q)/2 + d)*w - Y*q/2 - d/2)*
(w - 1/2)*b^2 + 2*(w*z + c - z)*w*q*(w - 1/2)*b + w*q*((Y*q - 2*d)*w - Y*q
+ d)*z)*a^2 - 2*q*(2*(w^2 - w + 1/2)*((c - (3*z)/2)*w - c/2 + (3*z)/2)*b^2
+ ((Y*q + 3*d)*w^2 + (-(3*Y*q)/2 - 3*d)*w + Y*q/2 + (3*d)/2)*z*b + c*q*w*
z/2)*a + 2*q^2*(((c - z)*w - c/2 + z)*b + d*z)*z)/(4*w*b*(w - 1/2)^2*a^3 +
4*((w^2 + 1)*(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*
b^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*
z)*(2*a*((w - 1)*Y*(w - 1/2)*w^2*a + (-c + (3*z)/2)*w^3 + (c/2 - (5*z)/2)*
w^2 + (3*w*z)/2 - z/2)*b^2 + (2*(w - 1)*Y*(w - 1/2)*w*a^3 - 2*c*(w - 1/2)*
w*a^2 - 2*z*((Y*q + (3*d)/2)*w^2 + (-(3*Y*q)/2 - d)*w + Y*q/2 + d/2)*a + 2*
```

```
q*((c - z)*w - c/2 + z)*z)*b - (w*Y*(w - 1)*a^2 - c*w*a - 2*d*z)*q*z)/(4*w*
a*(w - 1/2)^2*b^3 + 4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*z/2)*(w - 1/2)*b^2 +
4*(w*(w - 1/2)^2*a^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a*b - 2*((w^2 -
1/2*w)*a^2 - 2*z*q)*q*z));
```

$$\pi = \left(\left(-3.2076\left(1.1\left(w-\frac{1}{2}\right)(w-1)-0.6500000000\,w-0.1500000000\right)w\left(w-\frac{1}{2}\right)-4.31244\,(w-1)\left(w-\frac{1}{2}\right)^2+3.9204\,(1.9\,w^3-3.8\,w^2+4.450000000\,w-1.750000000)\left(w-\frac{1}{2}\right)+3.3858\,(2\,w-0.4)\,w\left(w-\frac{1}{2}\right)-6.156\,(0.6500000000\,w+0.1500000000)\,w+12.4146\left(w^2-w+\frac{1}{2}\right)(0.933333333\,w-1.466666667)-50.41079999\,w^2+40.80820000\,w+40.06340000\right)\left(1.960200000\,w^4+1.712699999\,w^3-30.67920000\,w^2+30.16390000\,w+25.24400000-2.8512\left(w-\frac{1}{2}\right)w\right)\right)\Big/\left(\left(7.9992\,w\left(w-\frac{1}{2}\right)^2+3.24\left(1.21\,(w^2+1)\left(w-\frac{1}{2}\right)-1.900000000\,w\right)\left(w-\frac{1}{2}\right)-58.10200000\,w^2+49.74200000\,w+38.95000000\right)\left(7.9992\,w\left(w-\frac{1}{2}\right)^2+4.84\left(0.81\,(w^2+1)\left(w-\frac{1}{2}\right)-1.900000000\,w\right)\left(w-\frac{1}{2}\right)-55.06200000\,w^2+48.22200000\,w+38.95000000\right)\right)+\left(\left(-2.3958\,(1.8\,w^2-3.9\,w+0.5)\,w\left(w-\frac{1}{2}\right)-3.52836\,w^3-44.10648\,w^2+36.79675000\,w+36.55649000+3.9204\,(2\,w^3-4\,w^2+4.6\,w-1.800000000)\left(w-\frac{1}{2}\right)+4.356\,(-0.3+1.9\,w)\,w\left(w-\frac{1}{2}\right)+4.598\,w\,(-1.2\,w-0.4)-7.128\left(w^2-w+\frac{1}{2}\right)(-1.250000000\,w+2.050000000)\right)\left(1.9602\,(w-1)\left(w-\frac{1}{2}\right)w^2+2.227500000\,w^3-23.59170000\,w^2+27.01990000\,w+22.16350000+2.3958\,(w-1)\left(w-\frac{1}{2}\right)w-3.4848\left(w-\frac{1}{2}\right)w-4.598\,w\,(w-1)\right)\right)\Big/\left(\left(7.9992\,w\left(w-\frac{1}{2}\right)^2+4.84\left(0.81\,(w^2+1)\left(w-\frac{1}{2}\right)-1.900000000\,w\right)\left(w-\frac{1}{2}\right)-55.06200000\,w^2\right. \tag{37}$$

$$+ 48.22200000\ w + 38.95000000\Big)\ \Big(7.9992\ w\ \Big(w - \frac{1}{2}\Big)^2 + 3.24\ \Big(1.21\ (w^2 + 1)\ \Big(w - \frac{1}{2}\Big) - 1.900000000\ w\Big)\ \Big(w - \frac{1}{2}\Big) - 58.10200000\ w^2 + 49.74200000\ w + 38.95000000\Big)\Big)$$

```
> simplify( (37) )
```

$$\pi = (4238.637\ w + 4822.961472\ w^4 - 6405.630427\ w^3 - 2384.341414\ w^2 + 1621.839257 + 14.60105935\ w^8 + 32.49337291\ w^7 - 468.4996984\ w^6 - 136.3184449\ w^5) \Big/ (4.0788\ w^3 - 67.3567\ w^2 + 50.8994\ w + 3.9204\ w^4 + 39.9301)^2 \quad \textbf{(38)}$$

```
> subs(a=0.9,b=1.1,z=2,q=1.9,c=1.6,d=1.7,Y=1,p = (-4*(Y*(w - 1/2)*(w - 1)*a
  + (-c + z/2)*w + c/2 - z/2)*w*a*(w - 1/2)*b^3 + (-4*(w - 1)*Y*(w - 1/2)^2*
  a^3 + 4*(w^3*z - 2*w^2*z + (c + (3*z)/2)*w - c/2 - z/2)*(w - 1/2)*a^2 + 2*
  (Y*q*w - Y*q + d)*w*z*(w - 1/2)*a - 2*((c - z/2)*w - c/2 + z/2)*w*q*z)*b^2
  + 6*((w^2 - w + 1/2)*((Y*q - (2*d)/3)*w - Y*q + d/3)*a^2 - ((c + z/3)*w^2 +
  (-c - z/2)*w + c/2 + z/6)*q*a - d*q*w*z/6)*z*b - 2*(((Y*q - d)*w - Y*q +
  d/2)*a - c*q)*q*z^2)/(4*w*a*(w - 1/2)^2*b^3 + 4*((w^2 + 1)*(w - 1/2)*a^2 -
  q*w*z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2 - 13*(w^2 - 12/13*w + 5/13)*
  q*z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*z*q)*q*z));
```

$$p = \Big(-4.7916\ \Big(0.9\ \Big(w - \frac{1}{2}\Big)\ (w - 1) - 0.6\ w - 0.2000000000\Big)\ w\ \Big(w - \frac{1}{2}\Big) - 3.52836\ (w - 1)\ \Big(w - \frac{1}{2}\Big)^2 + 3.9204\ (2\ w^3 - 4\ w^2 + 4.6\ w - 1.800000000)\ \Big(w - \frac{1}{2}\Big) + 4.356\ (1.9\ w - 0.2)\ w\ \Big(w - \frac{1}{2}\Big) - 9.196\ (0.6\ w + 0.2000000000)\ w + 10.692\ \Big(w^2 - w + \frac{1}{2}\Big)\ (0.766666667\ w - 1.333333333) - 51.16320001\ w^2 + 41.73920000\ w + 34.99040000\Big) \Big/ \Big(7.9992\ w\ \Big(w - \frac{1}{2}\Big)^2 + 4.84\ \Big(0.81\ (w^2 + 1)\ \Big(w - \frac{1}{2}\Big) - 1.9\ w\Big)\ \Big(w - \frac{1}{2}\Big) - 55.06200000\ w^2 + 48.22200000\ w + 38.95000000\Big) \quad \textbf{(39)}$$

```
> simplify( (39) )
```

$$p = \frac{3.52836\ w^4 + 4.84308\ w^3 - 57.08175001\ w^2 + 38.80505999\ w + 32.27285}{4.0788\ w^3 - 67.3567\ w^2 + 50.8994\ w + 3.9204\ w^4 + 39.9301} \quad \textbf{(40)}$$

```
> subs(a=0.9,b=1.1,z=2,q=1.9,c=1.6,d=1.7,Y=1,r = (-2*((2*w^2 - 3*w + 1)*b +
  (Y*q - 2*d)*w - Y*q + d)*w*b*(w - 1/2)*a^3 + ((-4*w^3 + 8*w^2 - 5*w + 1)*
  b^3 + 4*(Y*q*w^3 - 2*Y*q*w^2 + ((3*Y*q)/2 + d)*w - Y*q/2 - d/2)*(w - 1/2)*
  b^2 + 2*(w*z + c - z)*w*q*(w - 1/2)*b + w*q*((Y*q - 2*d)*w - Y*q + d)*z)*
  a^2 - 2*q*(2*(w^2 - w + 1/2)*((c - (3*z)/2)*w - c/2 + (3*z)/2)*b^2 + ((Y*q
```

```
+ 3*d)*w^2 + (-(3*Y*q)/2 - 3*d)*w + Y*q/2 + (3*d)/2)*z*b + c*q*w*z/2)*a +
2*q^2*(((c - z)*w - c/2 + z)*b + d*z)*z)/(4*w*b*(w - 1/2)^2*a^3 + 4*((w^2 +
1)*(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*b^2 - 13*
(w^2 - 12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*z));
```

$$r = \left(-1.6038\ (2.2\ w^2 - 4.8\ w + 0.9)\ w\ \left(w - \frac{1}{2}\right) - 4.31244\ w^3 - 44.04312\ w^2 + 37.67485000\ w + 42.90091000 + 3.9204\ (1.9\ w^3 - 3.8\ w^2 + 4.550000000\ w - 1.800000000)\ \left(w - \frac{1}{2}\right) + 3.3858\ (2\ w - 0.4)\ w\ \left(w - \frac{1}{2}\right) + 3.078\ w\ (-1.5\ w - 0.2) - 8.2764\ \left(w^2 - w + \frac{1}{2}\right)\ (-1.4\ w + 2.200000000)\right) \Big/ \left(7.9992\ w\ \left(w - \frac{1}{2}\right)^2 + 3.24\ \left(1.21\ (w^2 + 1)\ \left(w - \frac{1}{2}\right) - 1.9\ w\right)\ \left(w - \frac{1}{2}\right) - 58.10200000\ w^2 + 49.74200000\ w + 38.95000000\right) \tag{41}$$

```
> simplify( (41) )
```

$$r = \frac{98.01\ w^4 + 122.166\ w^3 - 1580.031\ w^2 + 1162.10125\ w + 933.13075}{101.97\ w^3 - 1683.9175\ w^2 + 1272.485\ w + 98.01\ w^4 + 998.2525} \tag{42}$$

```
> subs(a=0.9,b=1.1,z=2,q=1.9,c=1.6,d=1.7,Y=1,Pi=(-4*(Y*(w - 1/2)*(w - 1)*a +
(-c + z/2)*w + c/2 - z/2)*w*a*(w - 1/2)*b^3 + (-4*(w - 1)*Y*(w - 1/2)^2*a^3
+ 4*(w^3*z - 2*w^2*z + (c + (3*z)/2)*w - c/2 - z/2)*(w - 1/2)*a^2 + 2*(Y*q*
w - Y*q + d)*w*z*(w - 1/2)*a - 2*((c - z/2)*w - c/2 + z/2)*w*q*z)*b^2 + 6*(
(w^2 - w + 1/2)*((Y*q - (2*d)/3)*w - Y*q + d/3)*a^2 - ((c + z/3)*w^2 + (-c
- z/2)*w + c/2 + z/6)*q*a - d*q*w*z/6)*z*b - 2*(((Y*q - d)*w - Y*q + d/2)*a
- c*q)*q*z^2)/(4*w*a*(w - 1/2)^2*b^3 + 4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*
z/2)*(w - 1/2)*b^2 + 4*(w*(w - 1/2)^2*a^2 - 13*(w^2 - 12/13*w + 5/13)*q*
z/4)*a*b - 2*((w^2 - 1/2*w)*a^2 - 2*z*q)*q*z)*(3*((2/3*w^4 - w^3 + 1/3*w^2)
*b + (Y*q - (2*d)/3)*w^3 + (-(5*Y*q)/3 + d/3)*w^2 + Y*q*w - Y*q/3)*b*a^2 +
((2*w^3 - 3*w^2 + w)*b^3 - 2*d*(w - 1/2)*w*b^2 - 3*q*((c + (2*z)/3)*w^2 +
(-(2*c)/3 - z)*w + c/3 + z/3)*b - 2*((Y*q - d)*w - Y*q + d/2)*q*z)*a - (
(w^2 - w)*b^2 - d*w*b - 2*c*q)*q*z)/(4*w*b*(w - 1/2)^2*a^3 + 4*((w^2 + 1)*
(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*b^2 - 13*(w^2 -
12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*z)+(-2*((2*w^2 -
3*w + 1)*b + (Y*q - 2*d)*w - Y*q + d)*w*b*(w - 1/2)*a^3 + ((-4*w^3 + 8*w^2
- 5*w + 1)*b^3 + 4*(Y*q*w^3 - 2*Y*q*w^2 + ((3*Y*q)/2 + d)*w - Y*q/2 - d/2)*
(w - 1/2)*b^2 + 2*(w*z + c - z)*w*q*(w - 1/2)*b + w*q*((Y*q - 2*d)*w - Y*q
+ d)*z)*a^2 - 2*q*(2*(w^2 - w + 1/2)*((c - (3*z)/2)*w - c/2 + (3*z)/2)*b^2
+ ((Y*q + 3*d)*w^2 + (-(3*Y*q)/2 - 3*d)*w + Y*q/2 + (3*d)/2)*z*b + c*q*w*
z/2)*a + 2*q^2*(((c - z)*w - c/2 + z)*b + d*z)*z)/(4*w*b*(w - 1/2)^2*a^3 +
4*((w^2 + 1)*(w - 1/2)*b^2 - q*w*z/2)*(w - 1/2)*a^2 + 4*b*(w*(w - 1/2)^2*
b^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a - 2*q*((w^2 - 1/2*w)*b^2 - 2*z*q)*
z)*(2*a*((w - 1)*Y*(w - 1/2)*w^2*a + (-c + (3*z)/2)*w^3 + (c/2 - (5*z)/2)*
w^2 + (3*w*z)/2 - z/2)*b^2 + (2*(w - 1)*Y*(w - 1/2)*w*a^3 - 2*c*(w - 1/2)*
w*a^2 - 2*z*((Y*q + (3*d)/2)*w^2 + (-(3*Y*q)/2 - d)*w + Y*q/2 + d/2)*a + 2*
```

```
q*((c - z)*w - c/2 + z)*z)*b - (w*Y*(w - 1)*a^2 - c*w*a - 2*d*z)*q*z)/(4*w*
a*(w - 1/2)^2*b^3 + 4*((w^2 + 1)*(w - 1/2)*a^2 - q*w*z/2)*(w - 1/2)*b^2 +
4*(w*(w - 1/2)^2*a^2 - 13*(w^2 - 12/13*w + 5/13)*q*z/4)*a*b - 2*((w^2 -
1/2*w)*a^2 - 2*z*q)*q*z));
```

$$\pi = \left(\left(-4.7916\left(0.9\left(w-\frac{1}{2}\right)(w-1)-0.6\,w-0.2000000000\right)w\left(w-\frac{1}{2}\right)\right.\right. \tag{43}$$

$$-3.52836\,(w-1)\left(w-\frac{1}{2}\right)^2+3.9204\,(2\,w^3-4\,w^2+4.6\,w-1.800000000)\left(w-\frac{1}{2}\right)+4.356\,(1.9\,w-0.2)\,w\left(w-\frac{1}{2}\right)-9.196\,(0.6\,w+0.2000000000)\,w$$

$$+10.692\left(w^2-w+\frac{1}{2}\right)(0.766666667\,w-1.333333333)-51.16320001\,w^2$$

$$\left.+41.73920000\,w+34.99040000\right)\left(1.960200000\,w^4+1.504800001\,w^3\right.$$

$$\left.\left.-30.71420000\,w^2+33.91780000\,w+21.82150000-3.7026\left(w-\frac{1}{2}\right)w\right)\right)\Big/$$

$$\left(\left(7.9992\,w\left(w-\frac{1}{2}\right)^2+4.84\left(0.81\,(w^2+1)\left(w-\frac{1}{2}\right)-1.9\,w\right)\left(w-\frac{1}{2}\right)\right.\right.$$

$$\left.-55.06200000\,w^2+48.22200000\,w+38.95000000\right)\left(7.9992\,w\left(w-\frac{1}{2}\right)^2\right.$$

$$+3.24\left(1.21\,(w^2+1)\left(w-\frac{1}{2}\right)-1.9\,w\right)\left(w-\frac{1}{2}\right)-58.10200000\,w^2$$

$$\left.\left.+49.74200000\,w+38.95000000\right)\right)+\left(\left(-1.6038\,(2.2\,w^2-4.8\,w\right.\right.$$

$$+0.9)\,w\left(w-\frac{1}{2}\right)-4.31244\,w^3-44.04312\,w^2+37.67485000\,w+42.90091000$$

$$+3.9204\,(1.9\,w^3-3.8\,w^2+4.550000000\,w-1.800000000)\left(w-\frac{1}{2}\right)$$

$$+3.3858\,(2\,w-0.4)\,w\left(w-\frac{1}{2}\right)+3.078\,w\,(-1.5\,w-0.2)-8.2764\left(w^2-w\right.$$

$$\left.+\frac{1}{2}\right)(-1.4\,w+2.200000000)\Big)\left(1.9602\,(w-1)\left(w-\frac{1}{2}\right)w^2+3.0492\,w^3\right.$$

$$-26.76960000\,w^2+26.68000000\,w+26.56600000+1.6038\,(w-1)\left(w-\frac{1}{2}\right)w$$

$$\left.\left.-2.8512\left(w-\frac{1}{2}\right)w-3.078\,w\,(w-1)\right)\right)\Big/\left(\left(7.9992\,w\left(w-\frac{1}{2}\right)^2\right.\right.$$

$$+3.24\left(1.21\,(w^2+1)\left(w-\frac{1}{2}\right)-1.9\,w\right)\left(w-\frac{1}{2}\right)-58.10200000\,w^2$$

$$\left.+49.74200000\,w+38.95000000\right)\left(7.9992\,w\left(w-\frac{1}{2}\right)^2+4.84\left(0.81\,(w^2\right.\right.$$

$$+1)\left(w-\frac{1}{2}\right)-1.9\ w\right)\left(w-\frac{1}{2}\right)-55.06200000\ w^2+48.22200000\ w+38.95000000\Big)\Big)$$

> *simplify*((43))

$$\pi=(4429.916832\ w+4906.386501\ w^4-6637.079537\ w^3-2434.205201\ w^2+1695.824056+14.60105935\ w^8+31.09614236\ w^7-475.3376601\ w^6-108.7924256\ w^5)\Big/(4.0788\ w^3-67.3567\ w^2+50.8994\ w+3.9204\ w^4+39.9301)^2 \quad \textbf{(44)}$$