Supplementary material to:

"A method to facilitate uncertainty analysis in LCAs of buildings"

This document represents the supplementary material to the main article. Its purpose is mainly to show that the results on the case with an LCI with as few as to entries are solid regardless of the two specific processes under consideration. For this reason, five random pairs of processes have been extracted from the full dataset and for each pair five runs of the algorithm have been performed to allow for any 'lucky sampling' to emerge and be identified.

Figure 1 shows for the 1st pair the final graphs of the mean difference (in percentage) between μ (Figure S1 a) and σ (Figure S1 b) of the two hypotheses. Figure S2 shows the results for the 2nd pair, Figure S3 for the 3rd, Figure S4 for the 4th, and Figure S5 for the 5th. In all cases (a) in the figure refers to the results for the mean and (b) to the results for the standard deviation. In the 5th case the sampling was intentionally bias to select twice the same process as to represent two independent process that by chance have exactly the same minimum, maximum, mean and standard deviation. In this specific case the results about the mean and standard deviation still holds true, the only difference being that the resulting overall distribution has a clear shape of a triangular distribution – a well-known fact in statistics when summing two identical uniform distribution [1].

Each run of the algorithm additionally produces 50 other plots which are related to histograms for each sampling value (10^{i+1} with $i=1,\ldots,7$) at each run and μ and σ differences at each cycle. We believe all those plots would be unnecessary here in this document, for its purpose is solely to show that any two entries randomly selected from the database produce the same output. However, we are happy to provide them if deemed necessary.

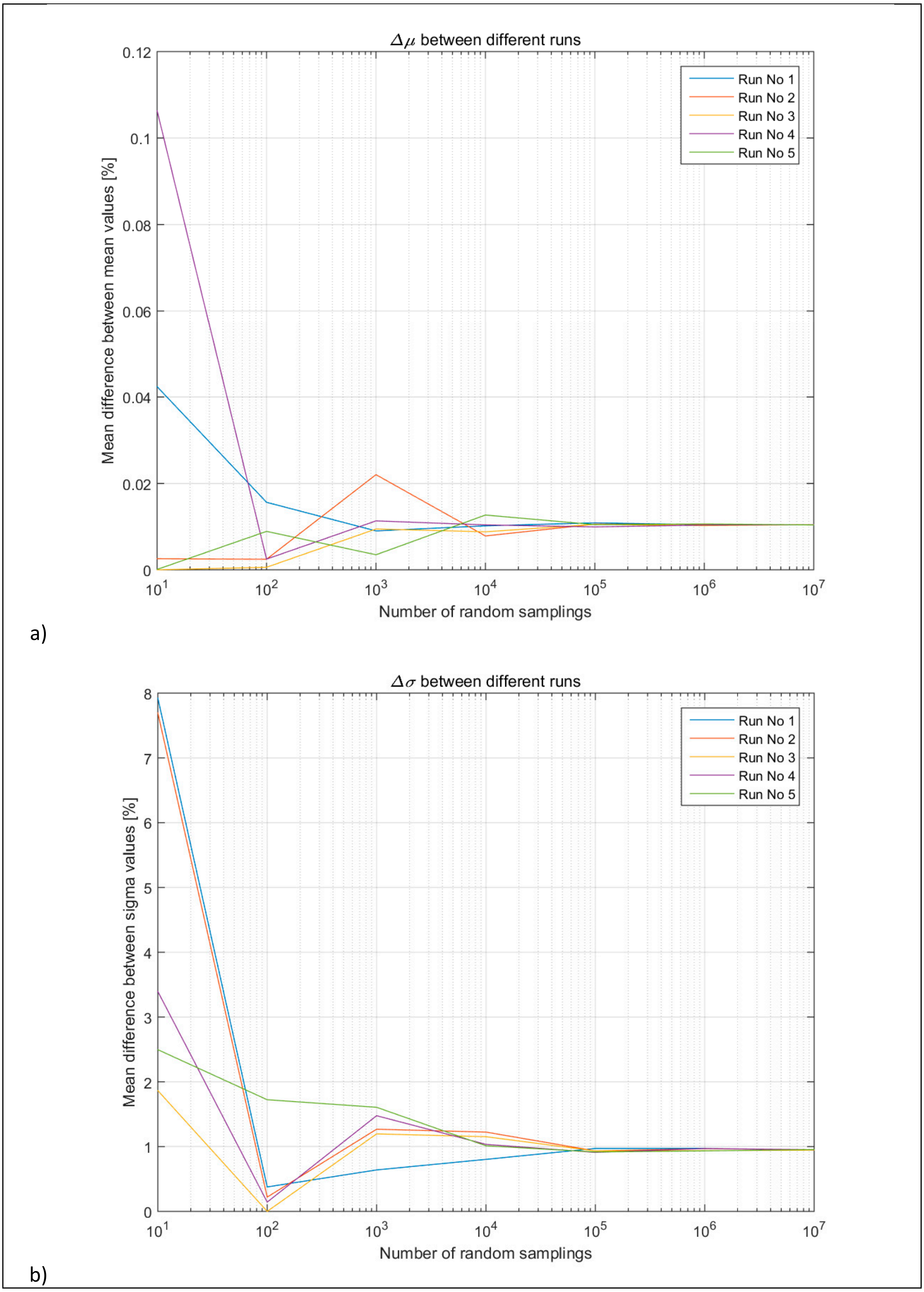
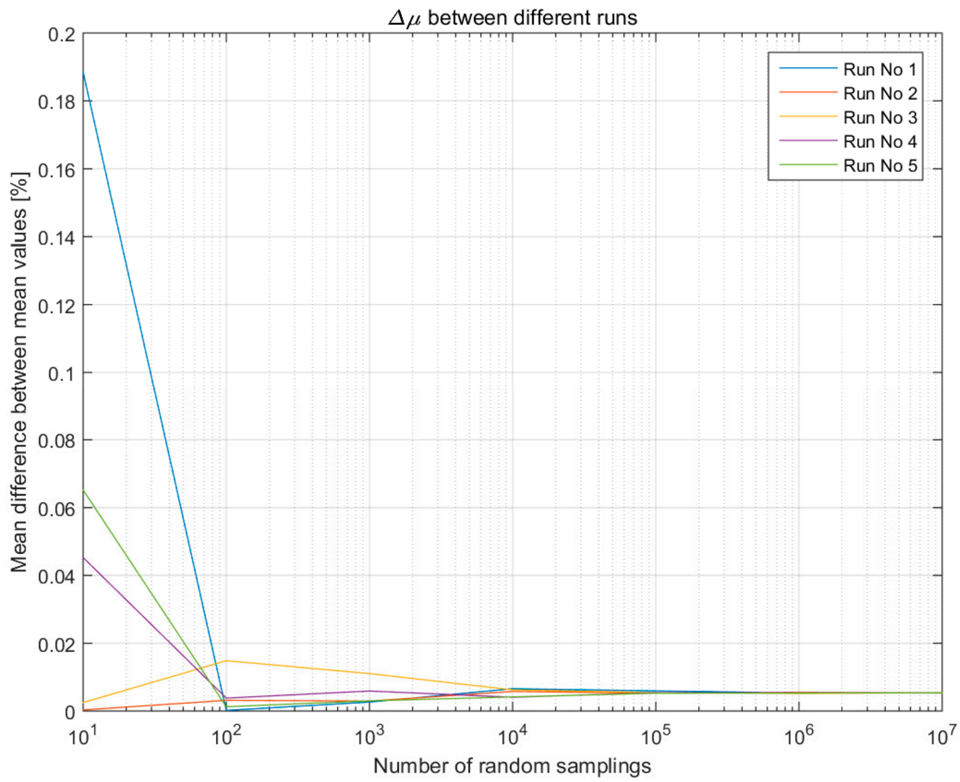
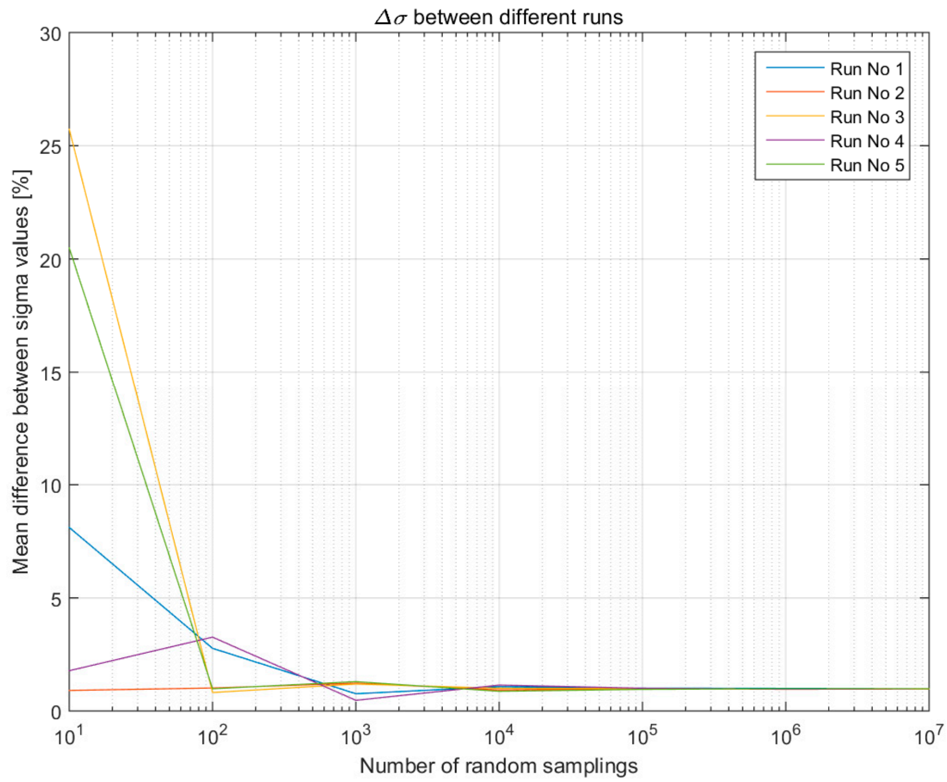


Figure S1 - μ and σ variation (percentage) between the two hypotheses across 5 runs (1st random combination of two LCI entries)



a)



b)

Figure S2 - μ and σ variation (percentage) between the two hypotheses across 5 runs (2nd random combination of two LCI entries)

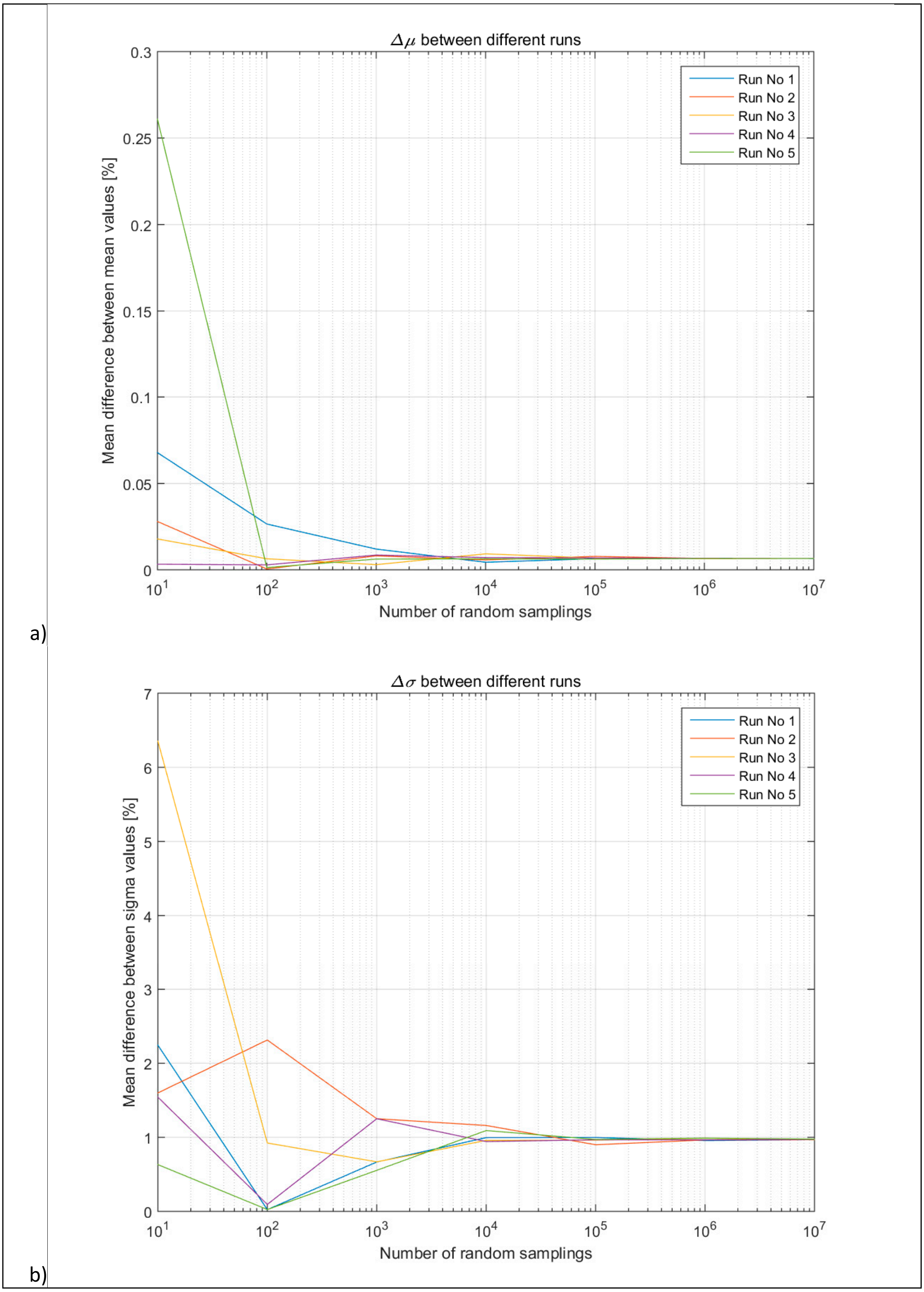


Figure S3 - μ and σ variation (percentage) between the two hypotheses across 5 runs (3rd random combination of two LCI entries)

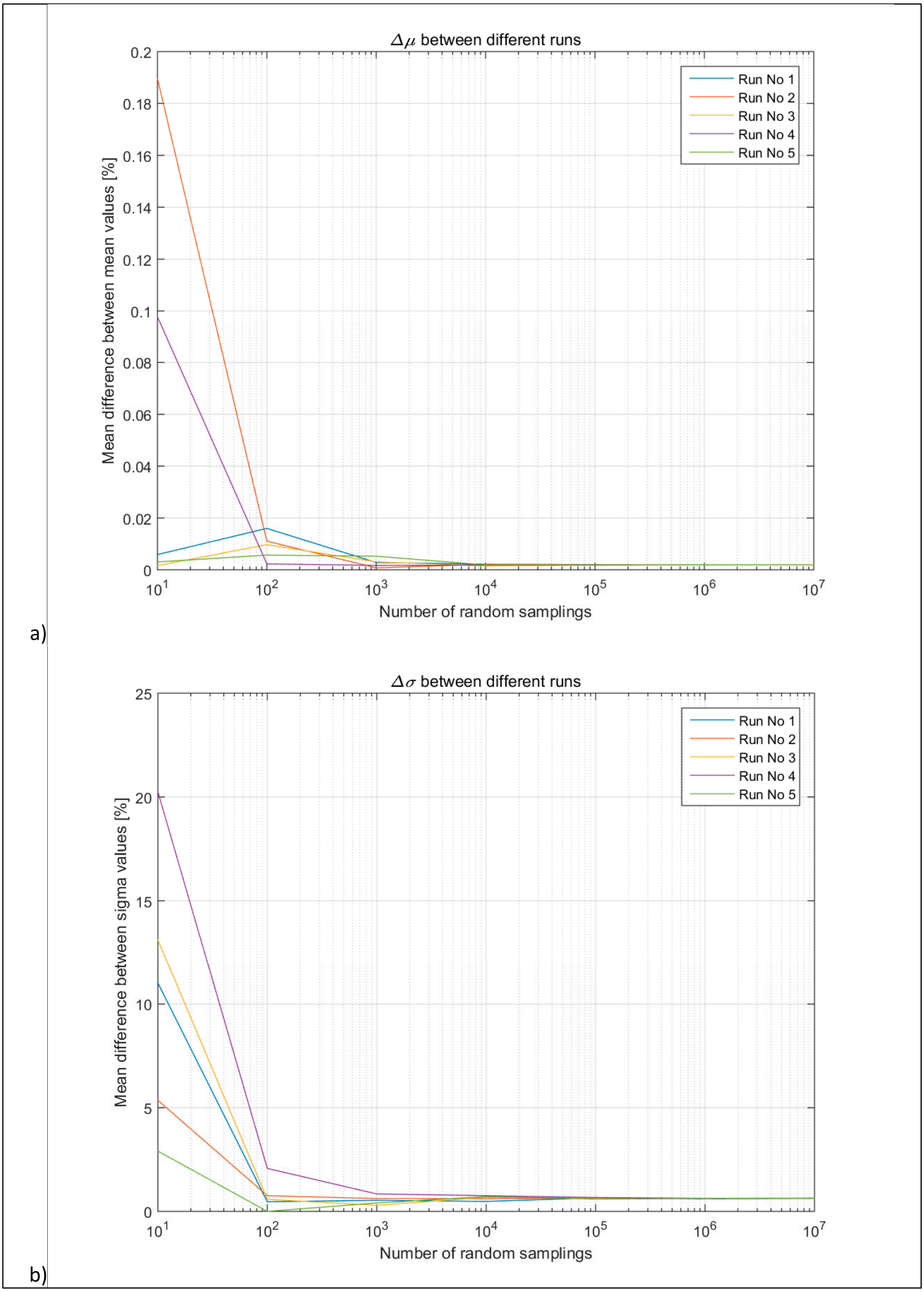
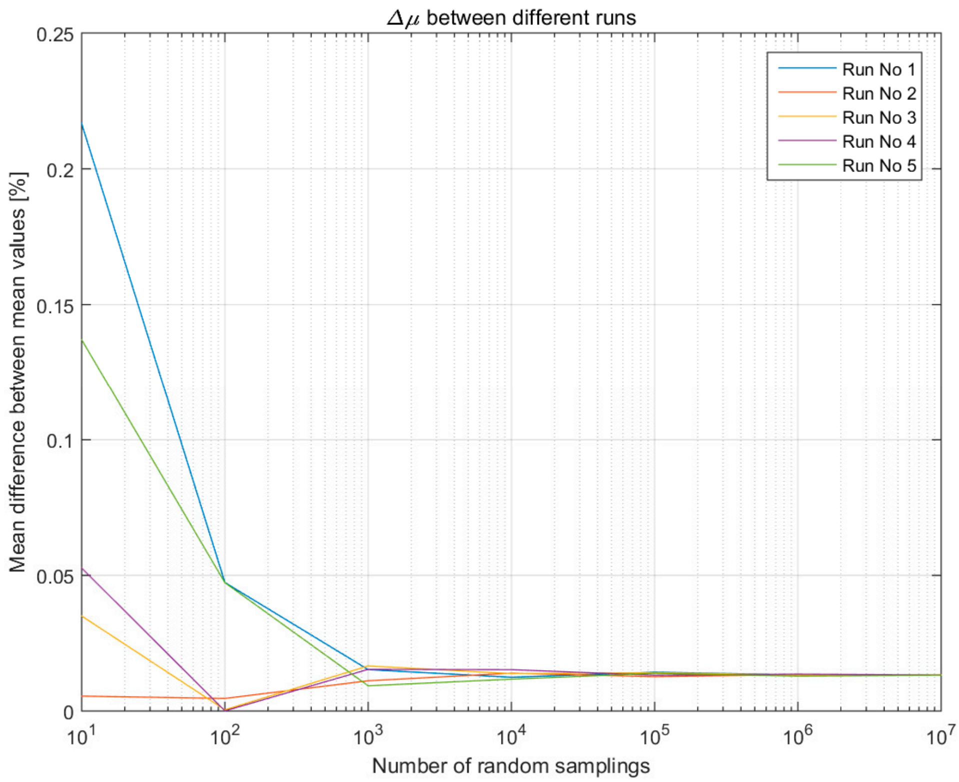
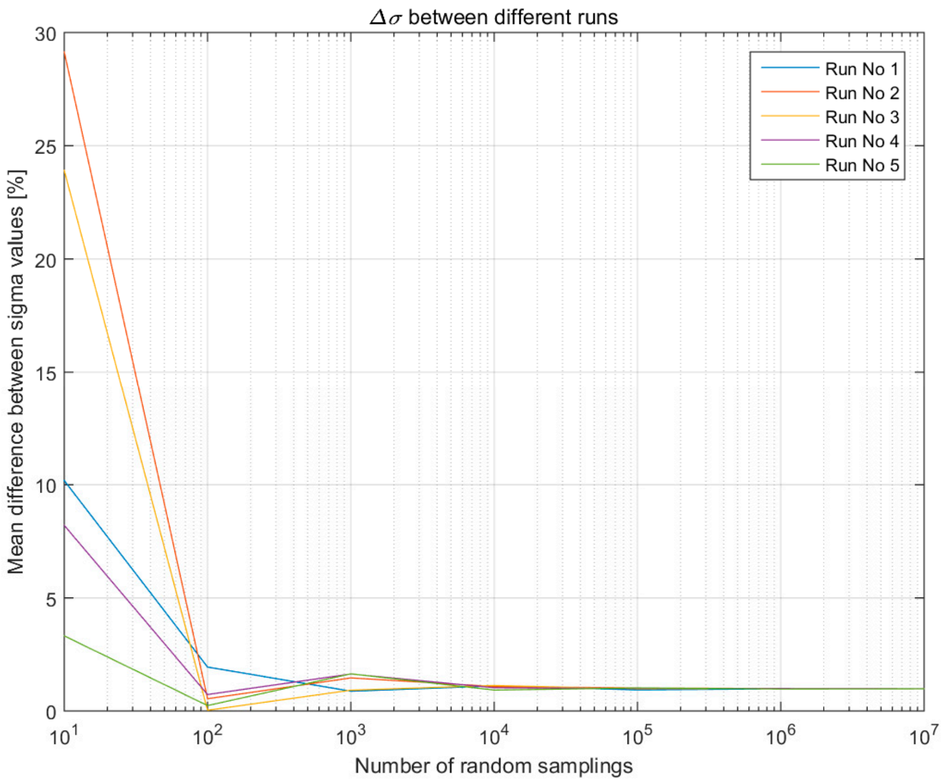


Figure S4 - μ and σ variation (percentage) between the two hypotheses across 5 runs (4th random combination of two LCI entries)



a)



b)

Figure S5 - μ and σ variation (percentage) between the two hypotheses across 5 runs (5th random combination of two LCI entries)

References

[1] MIT Open Course Ware – Probability Notes, Chapter 4, Sums of Random Variables. Available at: https://ocw.mit.edu/courses/physics/8-044-statistical-physics-i-spring-2013/readings-notes-slides/MIT8_044S13_ProbabilityCh4.pdf under a Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) Creative Commons License. 8.044 Statistical Physics 1. Spring 2013