Physics 336
HW3

1. Define the following terms:

   (a) precision

   (b) accuracy

   (c) systematic error

   (d) random error

   (e) round-off error

   (f) deviation

2. A measurement collects data for 100. s, and the result has uncertainty ±2.0%. Assuming only normally-distributed random errors, how long should the experiment run in order to have an uncertainty of

   (a) ±1.0% ?

   (b) ±0.10% ?

   (c) ±0.010% ?

3. For the given data set, Set 1 (in .csv format, attached), calculate $\overline{x}$, σ, and $\sigma_{\overline{x}}$. Express σ as an absolute uncertainty and as a 90% confidence level. Do this by creating

   (a) an Excel spreadsheet.

   (b) a Mathematica notebook

   (c) a Python script.

4. For the given data set, Set 2 (in .csv format, attached), consisting of 20 individual measurements of 20 data points each:

   (a) Determine the mean and standard deviation of each set.

   (b) Plot a histogram of the means. Does it look Gaussian?

   (c) Determine the standard deviation of the set of means from above. Does it match the claimed result $\sigma_{\overline{x}} = \dfrac{\sigma}{\sqrt{N}}$?

5. Suppose the attached data (Set3.csv) are measured for some quantity. Should any of these data points be rejected? Justify your answer.

6. A quantity is measured by three different researchers, with the results $\bar{x}_1 = 2.6 \pm 0.3$, $\bar{x}_2 = 2.8 \pm 0.1$, and $\bar{x}_3 = 2.7 \pm 0.2$. What overall result do these produce?