

Physics 2150 – Experimental Modern Physics – Spring 2008
Problem Set

Due February 27, 2008 at 4pm in the report turn-in box.

You may use calculators, but *not* computer programs.

1. A small sample of radioactive material is studied in a scintillation counter. The readout reports total decay counts every minute. The following results are obtained:

Minute	Counts
1	8
2	6
3	1
4	3
5	1
6	0

Make a binned histogram of these data. Show the points with the appropriate errors.

2. Fit the results in the previous problem to determine the isotope's mean life. What is the error on the lifetime? What is χ^2/dof ? Is this a good fit?
3. Two experimental groups have measured a fundamental quantity called ϵ' . One group found a result $\epsilon' = 0.115 \pm 0.033$; the other group found $\epsilon' = 0.037 \pm 0.030$.
 - a.) At what confidence level are these results consistent?
 - b.) Assuming they are consistent, what is the weighted average (and its uncertainty) of the two measurements?
 - c.) The group that found the larger value claimed to have discovered that $\epsilon' \neq 0$. Was that justified?
4. Taylor 9.4
5. Taylor 11.20