

Experimental Physics

Homework Questions: Due Monday, March 4?

1. If someone measures the time for a single period of a pendulum 8 times and uses the average time to calculate g for the pendulum whose length is measured to be $2.599\text{m} \pm 0.0005\text{m}$,
- find the mean period and its standard deviation.
 - Using these values for L and T , find the local g .
 - Find the standard deviation for g and write down the quantities $g \pm \sigma_g$ using the proper number of significant figures.

n	T(s)
1	3.254
2	3.154
3	3.217
4	3.250
5	3.186
6	3.265
7	3.268
8	3.164

2. A person measures the position of an object at several times. They are shown in the table at the right. It is expected that the velocity should be constant in this experiment.
- Estimate the velocity of the object by plotting x vs t and doing a regression on x vs t .
 - What is the uncertainty (or standard deviation) for the velocity?
 - Write the velocity \pm one standard deviation using the proper number of significant digits.

t(s)	x(m)
1.00	1.018
1.50	1.384
2.00	1.690
3.00	2.326
3.50	2.667
5.00	3.635
6.00	3.978
7.00	4.555
8.50	5.625
9.00	6.004

3. An alternate way of estimating the velocity in problem 2 above is to calculate the velocity in each interval and then average the velocities to get a mean velocity. Then you could find the standard deviation for these 9 velocities and the standard deviation for the mean velocity. Do this and write $v \pm \sigma_v$ to the correct number of significant figures. Do these agree with the result arrived at in problem 2 above?