

Lab homework

This will count as one lab grade and should be turned in at the beginning of the next lab period.

1) Follow Appendix A to make a graph of the following data:

t(s)	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50
v(m/s)	3.4	5.2	7.3	9.9	12.1	14.3	16.1	18.4	20.5

2) Answer questions a) and b) of Appendix A for the above data.

3) Follow Appendix B to analyze the following data:

L (cm)	93.24	93.31	93.88	92.78	93.45	93.42	92.85
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4) Answer questions a), b), c), d), and e) from Appendix B for this data set. Assume the true value is 93.40 cm.

5) Suppose you have a second set of data for the same experiment that gives the following results:

- The Q-test shows that all the data points should be kept.
- The mean $L = 93.92$ cm.
- The standard deviation for this set of values = 0.06 cm.
- The uncertainty of the mean for this data set is $\delta_L = 0.02$ cm.
- The reported value for this set is $L = (93.92 \pm 0.02)$ cm.
- The relative discrepancy compared to the true value is 0.9%.

- a) Is this set of data more or less precise than the set in question 3? How do you know?
- b) Is this set of data more or less accurate than the set in question 3? How do you know?
- c) Do the two data sets agree? How do you know?
- d) What is the relative discrepancy between the two data sets?

6) Use the rules in part f) of Appendix B to combine the following numbers:

$L_1 = 5.02 \pm 0.03$ m ; $L_2 = 8.44 \pm 0.06$ m; $t = 10.22 \pm 0.04$ s.

- Find the uncertainty of $L_1 + L_2$.
- Find the uncertainty of $L_1 \times L_2$.
- Find the uncertainty of L_1/t .
- Find the uncertainty of L_1^2 .
- Find the uncertainty of $\sqrt{L_1}$.