# Pre-Lab Practice: Measurements and Error Propagation <br> Review the Textbook: <br> - PHYS 1401: Serway \& Vuille: Appendix A and Chapter 1. <br> - PHYS 2425: Serway \& Jewett: Appendix B and Chapter 1. 

Practical Population Standard Deviation: $\sigma=\sqrt{\left(\overline{X^{2}}-\bar{X}^{2}\right)}$
Practical Sample Standard Deviation: $\quad s=\left(\sqrt{\frac{n}{n-1}}\right) \sigma$
The instantaneous speed of a car measured from the speedometer reading every second for 10 seconds, in units of miles per hour are: $0,1,9,11,17,10,28,40,36,55$.

1. The average of the above readings in mph is about (21)
2. The sample standard deviation of the above readings is about (18)
3. The mass of a ball is measured as $(60.2 \pm 0.5) \mathrm{g}$. What is the same measurement, given with a percent uncertainty?
( $60.2 \mathrm{~g} \pm 0.83 \%$ )
4. How many significant figures does the measured value of the mass of the ball have?
(3)
5. A mass of a box is described as $52 \pm 0.5$ kilograms, what is the range of values, in kilograms in which you expect to find the mass of the box?
(51.5, 52.5)
6. The volume of milk in a jug is determined by pouring it out into a container, first using a 50.0 ml jar in which a 0.5 ml error in measurement is estimated and then using a smaller 5.0 ml flask in which a 0.25 ml error in measurement is estimated. The milk was poured out 5 times using the 50.0 ml jar and 8 times using the 5.0 ml flask. What is the measured volume of milk in the jug, in ml ? State in the standard form (Total volume $\pm$ estimated uncertainty in volume)
( $290.0 \pm 4.5$ )
(Alternative: $290 \pm 5$. It's common to round the uncertainty to one significant figure.)
7. The dimensions of a table are measured with a meter stick. The length of the table is measured 3.431 m and width of the table is measured 2.187 m . The uncertainty of each of these measurements is 2 mm . What is the area of the table in $\mathrm{m}^{2}$ and its uncertainty? (7.504 $\pm 0.011$ )
(Alternative: $7.50 \pm 0.01$. It's common to round the uncertainty to one signif icant figure.)
