Physics 181
Spring 2020
Exam 1 Practice Problems

Correctly state the final answers and errors properly rounded.

1.) $0.9823 \pm 0.3281 \ \frac{m}{s}$

2.) $109.345 \pm 1.604 \ \frac{cm}{s^2}$

3.) $313.2451 \pm 19.4130 \ cm$

Propagate errors for the following functions.

4.) $Q = 16x^3$

5.) $A = B + D^3$

6.) $L = 5z(x + y^2)$

Example of an experimental question.

7.) **Density of Water**
   a. Using proper tools, take data measurements and fill out the following table. Do not subtract the mass of the dry cylinder. (NOTE: this table is filled out to provide

an example for the review. In an exam, you would be asked to take data and record units. The information in red here would not be provided in an experimental question on an exam)

total mass (g)	volume (mL)
68.00	9.5
70.00	11.6
72.00	13.5
74.00	15.7
76.00	17.5
78.00	19.6

b. Derive a value for the density of water, ρ. Explain how you arrived at this answer.

c. Calculate the error, S_ρ, on your density, ρ. Then, properly report your answer.

d. Using the accepted density for water, calculate your percent difference.
$\rho_{accepted} = 0.99823 \frac{g}{mL}$

e. Perform a precision vs. accuracy test, then comment on the reliability of your experimental procedure and types of errors present.

f. Derive a value for the mass of the dry cylinder, m_{cyl}, and the associated error. Formally report your answer.

Example of non-experimental problems (further application of experimental concepts used in lab, similar to the Questions section in each report).

8.) You are located 15 meters away from a stationary firetruck, which suddenly turns its sirens on. If sound travels at a speed of 343 m/s, how long does it take the sound wave to reach you?

9.) You measure the density of an unknown metal ring to be $\rho = 7.78\ g/cm^3$. What metal is the ring most likely comprised of? Justify your answer.

Metal	Density (g/cm^3)
Iron	7.87
Copper	8.96
Silver	10.49