

PRELAB 5: PROPAGATION OF ERRORS

Read Appendix C and complete this exercise before coming to laboratory

Answer the following questions related to error propagation. **Show all work, including numerical substitutions, to receive credit.**

- 1) [2 points] Calculate the difference, $d \pm \sigma_d$ between two lengths x and y , assuming you have measured x and y as: $x = (3.5555 \pm 0.0025)$ m and $y = (2.3210 \pm 0.0023)$ m.
- 2) [4 points] We wish to compare two quantities: $E_f = (15.06 \pm 0.12)$ J and $E_i = (14.87 \pm 0.11)$ J. If we define $\Delta E \equiv E_f - E_i$ and if E_f and E_i are in agreement, we expect $\Delta E = 0$. Find $\Delta E \pm \sigma_{\Delta E}$ and compare to 0 by stating how many σ values ΔE is from 0. (Note: This is how you should **always** describe your results in your reports.)
- 3) [2 points] Ohm's Law states $V = IR$, where I is the current flowing when a voltage V is applied across a resistor R . You have measured the current and the voltage as: $I = (0.1632 \pm 0.0051)$ A and $V = (5.2364 \pm 0.0032)$ V. Determine the resistance, $R \pm \sigma_R$ (Note: The unit for resistance is the ohm or Ω).
- 4) [2 points] A force $F = (2.36 \pm 0.14)$ N is exerted along a straight-line path through a distance $x = (1.3456 \pm 0.0024)$ m. Determine the work $W \pm \sigma_W$ done by force F .