

Exam 1 Review

2/2/24

Details:

- 1 page of notes
(front + back)
- bring a calculator
- 10-12 problems
- full 1hr 50mins.

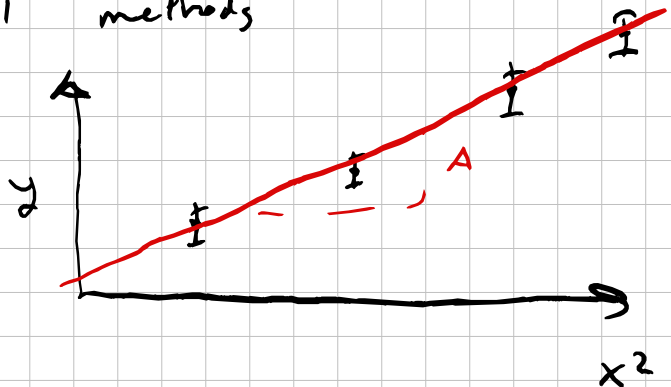
CH-2: How to report uncertainty

Standard form: $X = X_{\text{best}} \pm \delta_x$

best estimate \nearrow δ_x \uparrow uncertainty

- Significant Figures :
 - SF of the best estimate
 - Should same order of magnitude as uncertainty.
- Discrepancy
- True error
- Compare quantities
- graphical methods

$$y = Ax^2$$



- Fractional uncertainty

$$\frac{\delta x}{|x|_{\text{std}}}$$

Ch. 3 Propagation of Uncertainty

- Counting experiment
"square root law"
- Quadratic form:

add/
sub.

$$\left[\begin{array}{l} z = x + \dots - z \\ \delta z = \sqrt{(\delta x)^2 + \dots + (\delta z)^2} \end{array} \right.$$

multi/
div.

$$\left[\begin{array}{l} z = \frac{x \cdot z}{w \cdot \dots \cdot z} \\ \delta z = \sqrt{\left(\frac{\delta x}{|x|}\right)^2 + \dots} \end{array} \right.$$

- Uncertainty of a function of one-variable

$$\delta y = \left| \frac{dy}{dx} \right| \delta x$$

- General formula

$$y = f(x_1, \dots, z)$$

$$\delta y = \sqrt{\left(\frac{\partial y}{\partial x} \delta x \right)^2 + \dots}$$

random & independent

$$\delta y \leq \left| \frac{\partial y}{\partial x} \right| \delta x + \dots$$

CH. 4 Statistical Analysis

- random error
- systematic error
- mean
- standard deviation σ_x
- standard error $\sigma_{\bar{x}}$

CH. 5 The Normal Distribution

- Histograms

