

Homework (DUE Oct 17 (Thursday)):

Use the **numpy** module functions: exp and divide define functions f given below and their uncertainties σ_f (using error propagation method).

Formulae for σ_f should be derived on paper, and its final form should be coded in python. x values should be used as a list.

1) Calculate uncertainties σ_f on $f(x) = 2 \exp(-x/2)$ for the following x values: -10, -0.01, 20, 30, 45, 101, 0.5. Assume 10% uncertainty i.e. $\sigma_x/x = 0.10$.

2) Calculate a weighted average (using numpy and its functions instead of loops) of $f(x)$ for x values given in 1)

$$\sigma_f^2 = \left(\frac{\partial f}{\partial x_1} \right)^2 \sigma_{x1}^2 + \left(\frac{\partial f}{\partial x_2} \right)^2 \sigma_{x2}^2 + \dots + \left(\frac{\partial f}{\partial x_n} \right)^2 \sigma_{xn}^2$$

$$a = \frac{\sum_{i=1}^n (a_i / \sigma_i^2)}{\sum_{i=1}^n (1 / \sigma_i^2)}$$

$$\sigma^2 = \frac{1}{\sum_{i=1}^n (1 / \sigma_i^2)}$$