

MATH 301: Practice Problems

10pt

Show all appropriate work.

1. A student makes the following measurements:

$$a = 5 \pm 1 \text{ cm}$$

$$b = 18 \pm 2 \text{ cm}$$

$$c = 12 \pm 1 \text{ cm}$$

$$t = 3.0 \pm 0.5 \text{ sec}$$

$$m = 18 \pm 1 \text{ gm.}$$

Compute the following values giving both their uncertainties and relative uncertainties; $a + b + c$, $a + b - c$, ct , $4a$, $b/2$, and mb/t .

2. If x has relative error δ then what is the relative error in $y = x^n$.

3. In floating point

$$\frac{1}{3} = (1.010101\dots)_2 \times 2^{-2}.$$

How would $\frac{1}{3}$ be represented using double precision?

4. Find a basis for the subspace of \mathbb{R}^5 spanned by $\begin{pmatrix} 1 \\ 1 \\ 2 \\ 3 \\ 3 \end{pmatrix}$, $\begin{pmatrix} 1 \\ 0 \\ 1 \\ 2 \\ -1 \end{pmatrix}$, $\begin{pmatrix} 2 \\ 1 \\ 3 \\ 5 \\ 2 \end{pmatrix}$ and $\begin{pmatrix} 0 \\ 1 \\ 1 \\ 1 \\ 4 \end{pmatrix}$.

5. Find the determinant of $A = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 0 & 2 & -1 & 0 \\ 0 & 0 & 4 & 0 \\ 10 & 2 & 5 & 3 \end{pmatrix}$.