

Question 2

① single : 1.1921×10^{-7}
double : 2.2204×10^{-16}

② I would interpret "Machine accuracy" (based on the Matlab code) to be the smallest number such that the computer can't tell what the next nearest number is. I.e., the continuous number line must be discretized by a computer (to be ^{described} stored in memory)

continuous #'s

discretized #'s



Question 3

① In Matlab plot
(with $f'(x) = -\frac{1}{(x+2)^2} + 2x$)

② we have X_1 with uncertainty ϵ_1 and $g(X_1, X_2) = X_1 + X_2$
 X_2 ϵ_2

$$\Delta_p = \sum_{j=1}^n \left| \frac{a_j}{g} \frac{\partial g}{\partial a_j} \right| \epsilon_j$$

$$\frac{\partial g}{\partial X_1} = 1, \quad \frac{\partial g}{\partial X_2} = 1$$

$$= \left| \frac{X_1}{g(X_1, X_2)} \times \frac{\partial g}{\partial X_1} \right| \epsilon_1 + \left| \frac{X_2}{g(X_1, X_2)} \times \frac{\partial g}{\partial X_2} \right| \epsilon_2$$

$$= \left| \frac{X_1}{X_1 + X_2} \right| \epsilon_1 + \left| \frac{X_2}{X_1 + X_2} \right| \epsilon_2$$

$$\Delta_p = \frac{|X_1|}{|X_1 + X_2|} \epsilon_1 + \frac{|X_2|}{|X_1 + X_2|} \epsilon_2$$