4. [10 points] Let $f(x)$ be the differentiable function defined by

$$f(x) = x^3 + \cos(x^3), \qquad \text{so} \qquad f'(x) = 3x^2\left(1 - \sin(x^3)\right).$$

For each part below, you must use calculus to find and justify your answers. Clearly state your conclusions and show enough evidence to support them. You may use the graphs of sine and cosine given on the front page, if necessary. Recall that $\pi \approx 3.14$.

a. [3 points] The function $f(x)$ has exactly <u>three</u> critical points **in the interval** $(-1, 2)$. Find them. Give exact answers, and *show your work*.

Answer: $f(x)$ has critical points at $x = $ _____

b. [4 points] Find the x-coordinates of all *local* minima and maxima of $f(x)$ **on the interval** $(-1, 2)$. If there are none of a particular type, write NONE. *Justify your answers.*

Answer: Local min(s) at $x = $ _____   and Local max(es) at $x = $ _____

c. [3 points] Find the x-coordinates of all *global* minima and maxima of $f(x)$ **on the interval** $[-1, 1]$. If there are none of a particular type, write NONE.

Answer: Global min(s) at $x = $ _____   and Global max(es) at $x = $ _____