3. [12 points] Suppose $q(x)$ is a differentiable function defined for all real numbers x. The <u>derivative</u> and <u>second derivative</u> of $q(x)$ are given by

$$q'(x) = x^{2/3}(x-3)^{5/3}(x+5) \qquad \text{and} \qquad q''(x) = \frac{10(x-3)^{2/3}(x-1)(x+3)}{3x^{1/3}}.$$

a. [1 point] Find the x-coordinates of all critical points of $q(x)$. If there are none, write NONE.

Answer: Critical point(s) of $q(x)$ at $x =$ _____

b. [2 points] Find the x-coordinates of all critical points of $q'(x)$. If there are none, write NONE.

Answer: Critical point(s) of $q'(x)$ at $x =$ _____

c. [5 points] Find the x-coordinates of all local maxima and local minima of $q(x)$. If there are none of a particular type, write NONE. Use calculus to find and justify your answers, and be sure to show enough evidence to demonstrate that you have found all local extrema.

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

d. [4 points] Find the x-coordinates of all inflection points of $q(x)$. If there are none, write NONE. Use calculus to find and justify your answers, and be sure to show enough evidence to demonstrate that you have found all inflection points.

Answer: Inflection point(s) at $x =$ _____