Dawson College: **Calculus I** (SCIENCE): 201-SN2-RE-S14: Fall 2024: **Quiz 6** name: ____________________

Books, watches, notes or cell phones are **not** allowed. The **only** calculators allowed are the Sharp EL-531**. You **must** show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1. Consider the function and its derivatives

$$f(x) = \frac{e^x}{x^2},\ f'(x) = \frac{xe^x - 2e^x}{x^3},\ f''(x) = \frac{x^2e^x - 4xe^x + 6e^x}{x^4}$$

a. *(4 marks)* Find the domain, intercepts and asymptotes of $f(x)$ (if they exist).

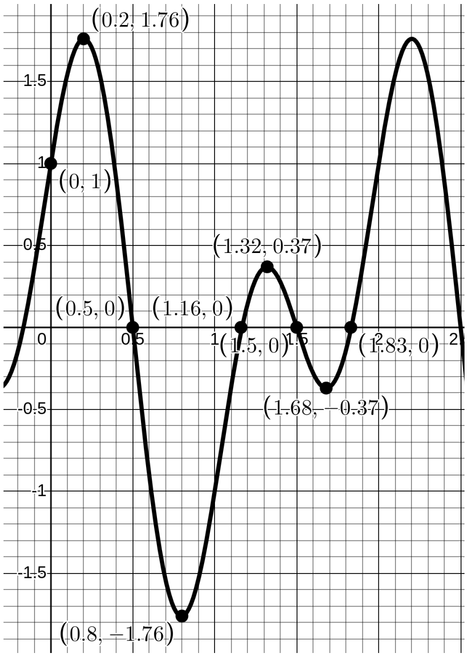
b. *(4 marks)* Find the intervals where $f(x)$ is increasing/decreasing and the points where local maxima and minima occur (if they exist).

c. *(4 marks)* Find the intervals where $f(x)$ is concave upward/downward and the points of inflection (if they exist).

d. *(4 marks)* Sketch the graph of $f(x)$. Show clearly all important points.

Question 2. *(3 marks)* Sketch the graph of a function that has two local maxima, one local minimum, and no absolute minimum.

Question 3. *(4 marks)* The graph of $f'(x)$ is given below, on the interval $[0,2]$ find the intervals of concavity and the x-coordinates of the inflection points of $f(x)$ if any. Justify.



Question 4. *(4 marks)* Find the absolute maximum and absolute minimum values of $f(x) = 3x^4 - 4x^3 - 12x^2 + 1$ on the interval $[-2, 3]$.