

Name: _____

Math 1A Quiz Ch. 4

November 4, 2013

Write in complete sentences and show all work.

1. (8 pts) Define a “critical number” of a function f . Sketch the graph of the function $f(x) = |x| \cdot (x + 2)$, and find its critical numbers. Find the absolute maximum and absolute minimum values of f on the interval $[-2, 1]$.

2. (12 pts) Show that the equation $x^3 + e^x = 0$ has exactly one real root.

3. (10 pts) Let $f(x) = x^3 - 12x + 2$.

- (a) Find the intervals of increase or decrease of f .
- (b) Find the local maximum and minimum values.
- (c) Find the intervals of concavity and the inflection points.
- (d) Use the information you found to sketch the graph of f . (Don't worry about finding the precise roots of f .)

4. (6 pts) Use L'Hospital's Rule to evaluate the limit:

$$\lim_{x \rightarrow 0^+} x^{\sqrt{x}}$$

5. (6 pts) A cylindrical can without a top is made to contain a particular volume $V \text{ cm}^3$ of liquid. Find the dimensions that will minimize the cost of the metal to make the can.