

Math 157 - Quiz 9

November 4, 2015

Name key Score _____

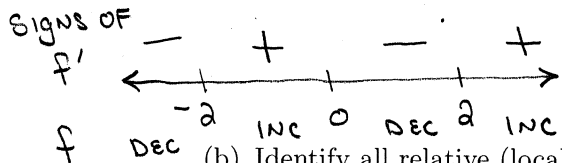
Show all work. Supply explanations when necessary.

1. (8 points) Let $f(x) = x^4 - 8x^2 + 5$.

$$f'(x) = 4x^3 - 16x = 4x(x^2 - 4)$$

(a) Find open intervals on which f is increasing/decreasing.

$$f'(x) = 4x(x-2)(x+2) = 0 \Rightarrow x=0, x=2, x=-2$$



f IS INCREASING ON $(-2, 0) \cup (2, \infty)$
AND DECREASING ON $(-\infty, -2) \cup (0, 2)$

(b) Identify all relative (local) extreme values.

$$f(-2) = -11 \text{ IS A REL MIN}$$

$$f(0) = 5 \text{ IS A REL MAX}$$

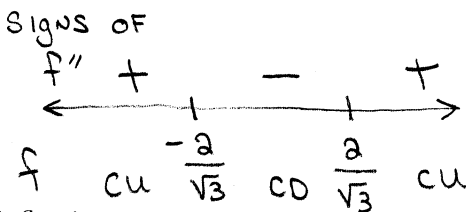
$$f(2) = -11 \text{ IS A REL MIN}$$

(c) Find open intervals on which the graph of f is concave up/down.

$$f''(x) = 12x^2 - 16 = 0$$

$$x^2 = \frac{16}{12} = \frac{4}{3}$$

$$x = \pm \frac{2}{\sqrt{3}}$$



GRAPH IS CU ON $(-\infty, -\frac{2}{\sqrt{3}}) \cup (\frac{2}{\sqrt{3}}, \infty)$

AND CD ON $(-\frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}})$

(d) Find all points of inflection.

$$x = -\frac{2}{\sqrt{3}}, y = -3.\bar{8}$$

$$x = \frac{2}{\sqrt{3}}, y = -3.\bar{8}$$

CONCAVITY CHANGES AT BOTH!

2. (2 points) Let $g(x) = e^x - 10x$. Find the single critical point and use the 2nd derivative to determine whether it gives a relative (local) maximum or minimum.

$$g'(x) = e^x - 10$$

$$g'(x) = 0 \Rightarrow x = \ln 10$$

$$g''(x) = e^x$$

$$g''(\ln 10) = e^{\ln 10} = 10 > 0 \Rightarrow$$

THERE IS A REL MIN AT $x = \ln 10$