Math 157 - Quiz 10

November 11, 2015

Name Key

Score

Show all work to receive full credit. Supply explanations when necessary.

1. (4 points) Find the absolute extreme values of $f(x) = 3x^4 - 8x^3 - 48x^2 + 5$ on $[-3, 1]$.

$$f'(x) = 12x^3 - 24x^2 - 96x$$
$$= 12x(x^2 - 2x - 8)$$
$$= 12x(x-4)(x+2)$$

CRIT PTS ARE

$x = 0$, $\cancel{\boxed{x=4}}$, $x = -2$

END PTS ARE $x = -3$, $x = 1$

$f(0) = 5$

$f(-2) = -75$ ← ABS MIN

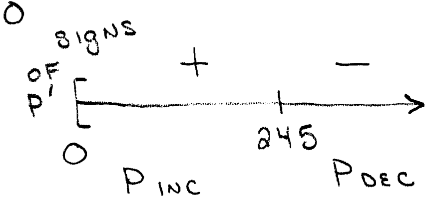
$f(-3) = 32$ ← ABS MAX

$f(1) = -48$

2. (4 points) The revenue from selling q items is $R(q) = 500q - q^2$ and the total cost is $C(q) = 150 + 10q$. Find the quantity that maximizes profit. Explain or show that you have indeed found a global maximum.

$$P(q) = R(q) - C(q) = 500q - q^2 - 150 - 10q$$
$$= 490q - q^2 - 150$$

$$P'(q) = 490 - 2q = 0$$
$$\Rightarrow q = 245$$



$q = 245$ GIVES A LOCAL AND GLOBAL MAX

3. (2 points) When production is 4000, marginal revenue is \$8.00 per unit and marginal cost is \$8.75 per unit. Do you expect maximum profit to occur at a production level above or below 4000? Explain.

$$P'(q) = R'(q) - C'(q)$$

$$P'(4000) = R'(4000) - C'(4000)$$
$$= 8 - 8.75 = -0.75$$

$\Rightarrow$ PROFIT IS DECREASING AT $q = 4000$ $\Rightarrow$ DECREASE PRODUCTION TO INCREASE PROFIT.