

November 17, 2011

Last Name: SOLUTIONS

First Name: _____

Student ID: _____

Quiz 9A

Question 1. (5 marks) Suppose the quantity x of Super Titan radial tires made available each week in the marketplace is related to the unit-selling price by the equation

$$p - \frac{1}{2}x^2 = 48$$

where x is measured in units of a thousand and p is in dollars. How fast is the weekly supply of Super Titan radial tires being introduced into the marketplace when $x = 6$, $p = 66$, and the price/tire is decreasing at the rate of \$3/week?

$$x=6, p=66, \quad \frac{dp}{dt} = -3$$

$$\frac{d}{dt}[p] - \frac{d}{dt}\left[\frac{1}{2}x^2\right] = \frac{d}{dt}[48]$$

$$\frac{dp}{dt} - 2x \frac{dx}{dt} = 0$$

$$-3 - (6) \frac{dx}{dt} = 0$$

$$-\frac{6}{6} \frac{dx}{dt} = 3$$

$$\frac{dx}{dt} = -\frac{3}{6} = -0.5$$

\therefore THE SUPPLY OF TIRES IS DECREASING BY ⁵⁰⁰ TIRES PER WEEK AT THE TIME IN QUESTION.

Question 2. (5 marks) Find the intervals where the function $f(x) = x^3 - 3x + 4$ is increasing/decreasing.

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

$$f'(x) = 0$$

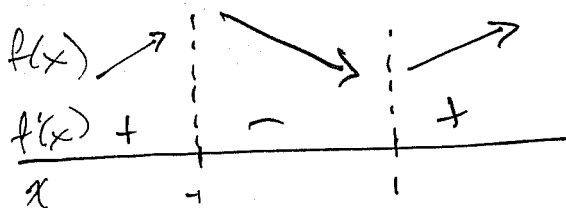
$$3x^2 - 3 = 0$$

$$(x^2 - 1) = 0$$

$$x^2 - 1 = 0$$

$$x = \pm 1$$

~~$f'(x)$ D.N.E~~
~~POLYNOMIAL~~



TEST POINTS

$$x = -2 \quad f'(-2) = 3(-2)^2 - 3 = 9 > 0$$

$$x = 0 \quad f'(0) = 3(0)^2 - 3 = -3 < 0$$

$$x = 2 \quad f'(2) = 3(2)^2 - 3 = 9 > 0$$

$\therefore f$ IS INCREASING ON $(-\infty, -1)$ AND $(1, \infty)$

f IS DECREASING ON $(-1, 1)$.