

Last Name: SOLUTIONS

First Name: _____

Student ID: _____

Quiz 9B

Question 1. (5 marks) Find the relative maximum and relative minima, if any, of

$$F(t) = 3t^5 - 20t^3 + 20.$$

$$F'(t) = 15t^4 - 60t^2$$

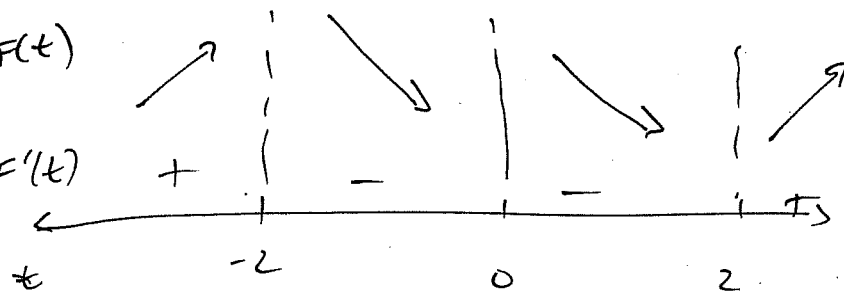
$$F'(t) = 0$$

$$15t^4 - 60t^2 = 0$$

$$15t^2(t^2 - 4) = 0$$

$$t = 0, \pm 2$$

~~$F'(t)$ D.N.E~~
~~POLYNOMIAL~~



TEST NUMBERS

$$x = -3, F'(-3) = 675 > 0$$

$$x = -1, F'(-1) = -45 < 0$$

$$x = 1, F'(1) = -45 < 0$$

$$x = 3, F'(3) = 675 > 0$$

$\therefore F(-2) = 84$ IS A RELATIVE
MAXIMUM

$F(2) = -44$ IS A
RELATIVE MINIMUM.

Question 2. (5 marks) Suppose the quantity demanded of Super Titan radial tires is related to the unit price by the equation

$$p + x^2 = 144$$

where x is measured in units of a thousand and p is in dollars. How fast is the quantity demanded changing when $x = 9$, $p = 63$, and the price/tire is increasing at the rate of \$2/week?

$$\frac{d}{dt} [p] + \frac{d}{dt} [x^2] = \frac{d}{dt} [144]$$

$$x = 9 \quad p = 63$$

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

$$\frac{dp}{dt} = 2$$

$$2 + 2(9) \frac{dx}{dt} = 0$$

$$18 \frac{dx}{dt} = -2$$

$$\frac{dx}{dt} = \frac{-2}{18} = -0.\bar{1}$$

∴ THE QUANTITY DEMANDED IS DECREASING AT A RATE OF 111 UNITS PER WEEK AT THE TIME IN QUESTION.