
MATH 182 QUIZ #10

SHOW ALL WORK NEATLY WHERE APPROPRIATE

1. Find $\frac{dy}{dx}$ (or y') for $x^4 + y^5 = 2y$.
2. Find the equation of the tangent line to the curve $x^3 + xy^2 - y = 97$ at the point $(3, 5)$.
3. The volume of a cube is increasing at a rate of $10 \text{ m}^3/\text{s}$. How fast is each side of the cube increasing at the moment when the side is 7 m ?
4. The radius of a circle is increasing at a rate of 6 cm/hr . How fast is the area of the circle increasing at the moment when the radius is 4 cm ?
5. Consider the following *demand function*:
$$q = -p^2 + 167$$
 - a. Find $E(p)$, the price elasticity of demand.
 - b. Calculate $E(p)$ when $p = \$12$.
 - c. Interpret the answer to b.
 - d. Which level of elasticity does this problem imply?
 - e. What does the level of elasticity mean in terms of the sensitivity to a price increase?
6. Find two positive numbers x and y whose sum is 56 , and such that the quantity xy^7 is as large as possible.

7. A farmer is building a rectangular horse corral using 1200 ft of fence. One of the sides of the corral is bordered by a river, so no fence needs to be built there. Find the dimensions of the corral that will produce the maximum area.

8. Consider the following Cost function:

$$C(x) = 3x^2 - 8x + 3$$

a. Find the exact cost of producing the 6th item.

b. Find the Marginal Cost function.

c. Use the Marginal Cost function to approximate the cost of producing the 6th item.

9. Sketch the graph of a function whose domain is \mathbb{R} , and which is differentiable at all but three points on its domain.

10. Consider the function: $y = \frac{6}{1+x^2}$. Find the domain, all the intercepts, all the asymptotes, where it's increasing and decreasing, and any extreme points. Then sketch the graph.

Extra Credit

1. For Problem #1, prove that it's NOT a function by finding three y -intercepts on the graph.

2. Find the two *inflection points* for Problem #10.