

EXAM 2 - MATH 112

YOUR NAME: _____

Friday, February 26

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. An object is thrown upward and its height at time t in seconds is given by

$$h(t) = -16t^2 + 128t + 5 \quad \text{in feet.}$$

- (a) Find the initial height of the object.
 - (b) Find the initial velocity of the object.
 - (c) Find the maximum height that the object will reach.
 - (d) Find the acceleration of the object at time t .

2. Find an equation for the tangent line to the graph of

$$f(x) = \sqrt[3]{(5x^2 + 7)^2} \text{ at } x = 2.$$

3. Consider the function

$$f(x) = -\frac{1}{x^2 - 9}.$$

- (a) Find the domain $\text{Dom}(f)$.
 - (b) Find the vertical and horizontal asymptotes (these are **straight lines**).
 - (c) Create the sign table for the first derivative, clearly showing in the last line the intervals of monotonicity and the relative extrema of f .
 - (d) Sketch the graph of f . (Your graph should be **clean** and all points of interest should be **labeled**.)

4. Your cousin is starting a bike business and he asks for your advice. He finds that it costs him \$100 to manufacture a bike and his fixed costs are \$1,000 per day. The price function is $p(x) = 400 - 25x$, where p is the price in dollars at which exactly x bikes will be sold. How many bikes should he produce and how much should he charge for each to maximize his profit?

$$R(x) =$$

$$C(x) =$$

$$P(x) =$$

Maximization:

5. A farmer wants to make four identical enclosures along a straight river as shown in the figure. If he has a total of 1800 yards of fencing and the sides along the river need no fencing what should be the dimensions of each enclosure to maximize the total enclosed area?

