

EXAM 2 - MATH 112

DATE: Tuesday, October 16

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Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. The height h in feet at time t in seconds of a silver dollar dropped from the top of a tall monument is given by $h = -16t^2 + 256$.
 - (a) Find its average velocity in the interval $[2, 3]$. (1 point)
 - (b) Find its instantaneous velocity when $t = 2$. (2 points)
 - (c) How long will it take the dollar to hit the ground? (1 point)
 - (d) Find its velocity when it hits the ground. (1 point)
2. Compute the derivatives of the following functions:
 - (a) $f(x) = (5x - 1)^9(7x^2 - 8x + 3)$ (3 points)
 - (b) $g(x) = \frac{x^4 + 7x^3 + 3}{x^3 + 1}$ (2 points)
3. Find the equation of the tangent line to the graph of $f(x) = \sqrt[3]{(7x + 1)^2}$ at $x = 1$. (5 points)
4.
 - (a) Find the derivative $\frac{dy}{dx}$ if $x^3y^3 - y = x$. (2 points)
 - (b) Find the equation of the tangent line to the graph of $x^2y + y^2x = -2$ at $(-1, 2)$. (3 points)
5. All edges of a cube are expanding at a rate of 3 centimeters per second. How fast is the surface area of the cube changing when each edge is 10 centimeters long? (5 points)
6. An accident at an oil drilling platform is causing a circular oil slick. The slick is 2 feet thick and when its radius is 100 feet, the radius is increasing at the rate of $\frac{2}{\pi}$ feet per minute. At what rate in cubic feet per minute is oil flowing from the accident site at the moment when the radius is 100 feet? (5 points)