

## PRACTICE EXAM 2 - MATH 112

DATE: Friday, February 17

INSTRUCTOR: George Voutsadakis

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. Compute the derivatives of the following functions:

(a)  $f(x) = (4x^8 - 3)(x^3 - 2x^2)$

(b)  $g(x) = \frac{5-6x+9x^3}{x^9-1}$

2. Suppose that  $f'''(x) = 20x^4 - \frac{2}{x^3}$ . Find  $f^{(6)}(x)$ .
3. Find the equation of the tangent line to the graph of  $2\sqrt[3]{x} + 3\sqrt{y} = 10$  at  $(8, 4)$ .
4. A swimming pool is 40 feet long, 20 feet wide, 4 feet deep at the shallow end and 9 feet deep at the deep end. Water is being pumped into the pool at the rate of 10 cubic feet per minute. How fast is the water rising when there is 4 feet of water in the deep end?
5. (a) Find the intervals of monotonicity and the relative extrema of the function  $f(x) = \frac{x^3}{4} - 3x$ .  
(b) Find the intervals of concavity and the inflection points of the function  $f(x) = 2x^4 - 8x^3 + 12x^2 + 12x$ .
6. A rectangular package to be sent by a postal service can have a maximum combined length and girth of 108 inches. Find the dimensions of the package with maximum volume. Assume that the package's dimensions are  $x$  by  $x$  by  $y$ , where  $y$  is the length.