

EXAM 2 - MATH 112

DATE: Friday, February 23

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. (a) Find the derivative of $f(x) = x^2\sqrt{x-2}$. (2 points)
(b) Find an equation for the tangent line to the graph of $g(x) = (\frac{6-5x}{2x-1})^3$ at $x = 1$. (3 points)
2. Compute the derivative $\frac{dy}{dx}$ at $(0, -2)$ if $x^3 - xy + y^2 = 4$. (5 points)
3. (a) The radius r of a right circular cone is increasing at a rate of 2 inches per minute. The height h of the cone is related to the radius by $h = 3r$. Find the rate of change of the volume when the radius is 24 inches. (Volume of a right circular cone with base radius r and height h is given by $V = \frac{1}{3}\pi r^2 h$.) (2 points)
(b) Find the absolute extrema of the function $f(x) = \frac{x}{x-2}$ in the interval $[3, 5]$. (3 points)
4. Find the intervals of monotonicity and the intervals of concavity of the function $f(x) = -4x^3 + 6x^2$. Summarize your results in the form of a table. (5 points)
5. A right triangle is formed in the first quadrant by the x -axis, the y -axis and a line through the point $(2, 3)$. Assume that this line intersects the x -axis at $(a, 0)$ and the y -axis at $(0, b)$.
 - (a) Find a formula relating a and b . (2 points)
 - (b) Find a formula for the area of the triangle in terms of a . (1 point)
 - (c) Find the vertices of the triangle such that its area is a minimum. (2 points)
6. When a wholesaler sold a certain product at \$40 per unit, sales were 300 units per week. After a price increase of \$5, however, the average number of units sold dropped to 275 per week.
 - (a) Find the demand function (price versus number of items) assuming that it is linear. (2 points)
 - (b) Find the revenue function. (1 point)
 - (c) What price per unit will yield a maximum total revenue? (2 points)