

HOMEWORK 4 - MATH 112

DUE DATE: Monday, February 16

INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Find the critical numbers and the open intervals on which the function is increasing or decreasing.

(a) $f(x) = x^2 - 5x$

(b) $f(x) = -(x + 1)^3$

(c) $f(x) = \frac{2x}{16-x^2}$

(d) $f(x) = \frac{x}{x+1}$

2. Find all relative extrema of the function

(a) $f(x) = x^3 - 6x^2 + 15$

(b) $f(x) = x^4 - 2x^3$

3. Find the absolute extrema of the function on the closed interval

(a) $f(x) = 5 - 2x^2$ on $[0, 3]$

(b) $f(x) = x^3 - 3x^2$ on $[-1, 3]$

(c) $f(x) = \frac{1}{3-x}$ on $[0, 2]$

4. Find the absolute extrema of the function on the interval $[0, +\infty)$

(a) $f(x) = \frac{4x}{x^2+1}$

(b) $f(x) = \frac{2x}{x^2+4}$

5. Use the second-derivative test where applicable to find the relative extrema of the function

(a) $f(x) = x^3 - 5x^2 + 7x$

(b) $f(x) = \sqrt{x^2 + 1}$

(c) $f(x) = \frac{x}{x-1}$

6. Find the points of inflection of the graph of

(a) $f(x) = (x - 1)^3(x - 5)$

(b) $f(x) = 2x^4 - 8x^3 + 12x^2 + 12x$

7. A rectangular page is to contain 36 square inches of print. The margins at the top and bottom and on each side are to be $1\frac{1}{2}$ inches. Find the dimensions of the page that will minimize the amount of paper used.
8. The combined perimeter of a circle and a square is 16. Find the dimensions of the circle and square that produce a minimum total area.