

M408C: Problem Set 8

Problem 1

Find the critical points of the following functions:

$$f(x) = x^3 + 6x^2 - 15x, \quad f(x) = x^2 e^{-3x}.$$

Problem 2

For the functions

$$f(x) = x^3 - 3x^2 - 9x + 4, \quad f(x) = \frac{x}{x^2 + 1}, \quad f(x) = e^{2x} + e^{-x}$$

1. Find the intervals on which f is increasing or decreasing.
2. Find the local maximum and minimum values of f .
3. Find the intervals of concavity and the inflection points.

Problem 3

Find the local maximum and minimum values of f using both the first and second derivative tests:

$$f(x) = 1 + 3x^2 - 2x^3, \quad f(x) = \sqrt{x} - \sqrt[4]{x}$$