Exam 3 - Practice 1

Notice:

- *This is a take home exam. Submit the screenshots of your answers and upload to Canvas by Dec 5*

Problem 1.

Given that

$$f(x) = x^3 - 3x^2 + 1$$

Find all the intervals where

a. $f(x)$ is increasing
b. $f(x)$ is decreasing
c. $f(x)$ is concave upward
d. $f(x)$ is concave downward

Problem 2

Find all the relative extrema of

$$f(x) = x^4 - 12x^3$$

Problem 3

Find an relative extrema of $f(x) = x^4 - 3x^2 + x + 1$ using gradient descent.

Problem 4

Find the absolute maximum and absolute minimum of $f(x) = x^3 - 6x^2 + 9x + 1$ on the interval $[5, 7]$.

Problem 5

The given equation has one (real) solution. Approximate the solution by Newton's method.

$$x^3 - 2x - 2 = 0$$