UNIVERSITY OF WOLLONGONG IN DUBAI

Math 141 Tutorial 4

Problem 1

Consider the function $f(x) = -2x^3 + 9x^2 + 24$.

a) Find all values of x for which f is increasing.
b) Find all values of x for which f is decreasing.
c) Find all values of x for which f has a relative maximum.
d) Find all values of x for which f has a relative minimum.
e) Sketch the graph of f.

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Problem 2

Find the critical numbers and the local extreme values of $f(x) = 12x^{2/3} - 16x$.

Problem 3

Find the absolute extrema of the following functions

$$f(x) = x^3 - 12x + 8, x \in [-4, 3].$$

$$f(x) = x^{4/3} - 3x^{1/3}, x \in [-1, 8].$$

Problem 4

Determine the concavity and find the points of inflection of the functions

$$f(x) = x^4 - 24x^2$$

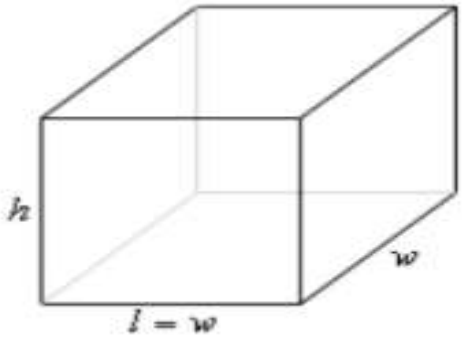
$$f(x) = 4x^3 - 15x^2 - 18x + 10$$

Problem 5
Sketch the graph of

$$f(x) = x^3 + \frac{3}{2}x^2 - 6x + 12$$

$$f(x) = x^{1/3}(x + 4).$$

Problem 6
We want to construct a box with a square base and we only have 10 m2 of material to use in construction of the box. Assuming that all the material is used in the construction process determine the maximum volume that the box can have.



Problem 7
Find the dimensions of the rectangle of area 100 square units that has the least perimeter.