

MA 137 Worksheet #21

Sections 5.3, 5.6 and 5.4

10/27/20

1. Assume that $f''(x) = x^2(2x - 1)(x + 3)$. Find the inflection points of the function f .

2. Let $g(x) = \frac{x^2}{1+x}$, $x \neq -1$. You are given that $g'(x) = \frac{2x + x^2}{(1+x)^2}$, $g''(x) = \frac{2}{(1+x)^3}$.
 - (a) Find the intervals over which $g(x)$ is increasing, and find the intervals over which $g(x)$ is decreasing. Find all local minima and all local maxima.
 - (b) Find the intervals over which $g(x)$ is concave up, and find the intervals over which $g(x)$ is concave down. Find all inflection points.

3. Set up both of the following optimization problems. Solve only problem 3(a).
 - (a) Manufacturers make a box (with no lid) out of a 250 cm by 250 cm square sheet of cardboard. They cut a square from each corner of the sheet so that the sides can be folded up to make her box. What is the volume of the largest possible box that they can make?

 - (b) Find the maximum area of a triangle formed in the second quadrant by the x-axis, y-axis and a tangent line to the graph of $f(x) = \frac{7}{(1-x)^3} - 1$.