

Worksheet 10/05: Curve Sketching. Optimization.

18.01 Fall 2009

Problem 1. Graph the function

$$\frac{1 - 2x}{1 + x}$$

Label all asymptotes (vertical, horizontal, and slant) that may exist. Determine intervals of concavity.

Problem 2. Determine concavity of the following functions:

a) $y = ax^2 + bx + c$, (you will have three cases here)

b) $y = x^3 - x + 3$, $y = x^3 + 3$, $y = x^3 + x + 3$

c) $y = x^4 - x^2 + 3$, $y = x^4 + 3$, $y = x^4 + x^2 + 3$

Problem 3. Find the point on the parabola $y^2 = 2x$ which is closest to the point $(1, 4)$. Would your answer change if x were limited to the interval $[-1, 1]$?

Problem 4. Given a piece of wire with unit length, make a cut to form one piece into a square and one piece into an equilateral triangle. Where should you cut to form wire figures enclosing the most area?