

Math 155 Worksheet 13

Name:

ID:

1. A box with no top is to be built by taking a 6"-by-10" sheet of cardboard and cutting x -in. squares out of each corner and folding up the sides. Find the value of x that maximizes the volume of the box.

2. Given

$$f(x) = x^2 + \frac{16}{x}, \quad f'(x) = \frac{2(x-2)(x^2+2x+4)}{x^2} \quad \text{and} \quad f''(x) = 2 + \frac{32}{x^3} = \frac{2(x^3+16)}{x^3},$$

do each of the following:

(i) Determine the domain of $f(x)$.

(ii) Find the intervals of increase and decrease and all local extrema.

(iii) Find the intervals of concavity and all inflection points.

(iv) Sketch the graph, reflecting all the features you have found above.

3. A two pen-corral is to be built. The outline of the corral forms two identical adjacent rectangles. If there is 120 ft of fencing available, what dimensions of the corral will maximize the enclosed area?

4. Given

$$f(x) = \frac{x^3}{x^2 - 2x - 3}, \quad f'(x) = \frac{x^2(x^2 - 4x - 9)}{(x^2 - 2x - 3)^2}, \quad \text{and} \quad f''(x) = \frac{14x^3 + 36x^2 + 54x}{(x^2 - 2x - 3)^3},$$

do each of the following.

(i) Determine the domain of f , and find all vertical and horizontal asymptotes, if they exist.

(ii) Find the intervals of increase/decrease, and local extrema.

(iii) Find the intervals of concavity, and inflection points.

(iv) Sketch the graph, reflecting all the features you have found above.