Worksheet 8

Fall 2016

MATH 221

Name: _____

1 Graph sketching, etc

Determine where the following functions are:

(a) Positive and negative
(b) Increasing and decreasing
(c) Concave up (convex) and concave down
(d) Behavior at infinity; slant or horizontal asymptotes?
(e) Behavior where the function is singular; vertical asymptotes?

Finally, sketch the graph!!

Also, ask yourself the question–how do you know where this function is positive and negative? Increasing and decreasing? Etc.

- $$f(x) = \sqrt{9 - x^2}$$

- $$f(x) = x^3 - 5x^2 + 2x + 8$$

- $$f(x) = \frac{x^2 - 2x + 1}{x + 1}$$

- $$f(x) = x \sin\left(\frac{1}{x}\right)$$

2 Potpourri

Answer the following mixed-up questions

(a)

$$\lim_{x \to 0} \frac{\cos(x) \tan(x^2) \tan(6x)}{18x^3}$$

(b) Compute the derivative of

$$f(x) = \sec(x) \cot(x)$$

(c) A spotlight is on the ground 20 ft away from a wall and a 6 ft tall person is walking towards the wall at a rate of 2.5 ft/sec. How fast is the height of the shadow changing when the person is 8 feet from the wall? Is the shadow increasing or decreasing in height at this time?

(d) Compute $\frac{dy}{dx}$ in terms of x and y for

$$y^2 + \cos(x) \sin(y) + 2x^3 = 10$$

(e) Find the tangent line to the graph of the function in (4) at the point $(0, 0)$

(f) Find all the asymptotes of the following function

$$f(x) = \frac{x^3 - 5x^2 + 2x + 8}{x^2 - x - 2}$$