

Name:

11/10/06

Math 111 Exam 2

1. (3pts each) True or False.

(a) It is possible for a polynomial function of degree 6 to have 3 real roots.

(b) The graph of a polynomial function of odd degree always has an x -intercept.

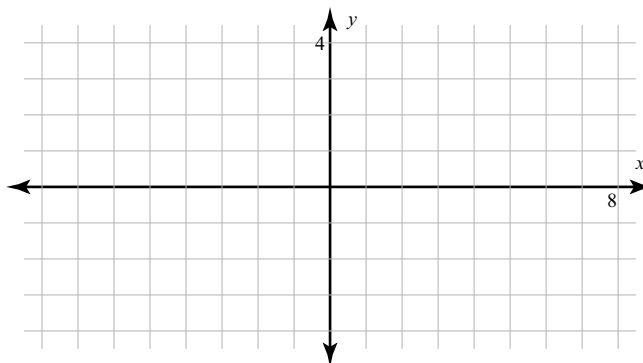
2. (3pts each) Fill in the blank.

(a) When $x^{31} + 4x^4 - 12x$ is divided by $x - 1$ the remainder is _____

(b) If $f(x) = 4|x + 3| - 2$ then the range of f is _____

3. (10pts) Sketch one graph of a polynomial function f which satisfies all of the following.

- The degree of f is even.
- The leading coefficient of f is negative.
- The constant term of f is negative.
- f has only 1 real root.
- f has exactly 3 local extrema.



4. (10pts) Solve for x given that $x = -2$ is a solution.

$$x^3 + 4x^2 - 2x - 12 = 0$$

5. (10pts) Find $f^{-1}(x)$ where f is the function with rule

$$f(x) = \frac{4x + 9}{3 - x}$$

6. (10pts) Find all real numbers x with

$$|3x + 4| \geq 3$$

7. Suppose f is the function with rule

$$f(x) = \frac{-2(x^2 + 7x + 12)}{(x + 3)(x - 2)}$$

- (a) (3pts) What is the domain of f ?

- (b) (3pts) Give the equation of any vertical asymptote (if any exist).

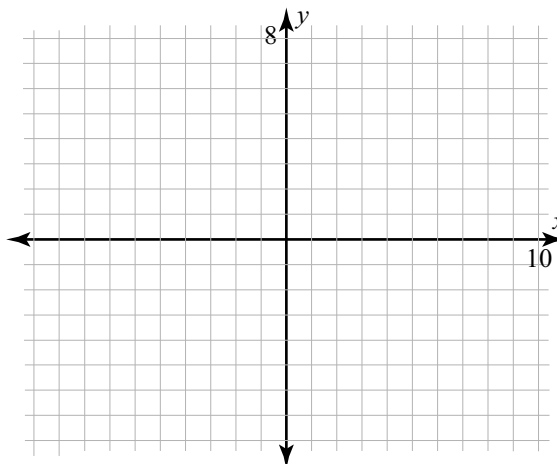
- (c) (3pts) State the x and y coordinates of all of the holes (if any exist).

- (d) (3pts) Give the equation of the horizontal asymptote.

- (e) (3pts) State the y -intercept (if one exists).

- (f) (3pts) State all x -intercepts (if any exist).

- (g) (8pts) Sketch a graph of f .

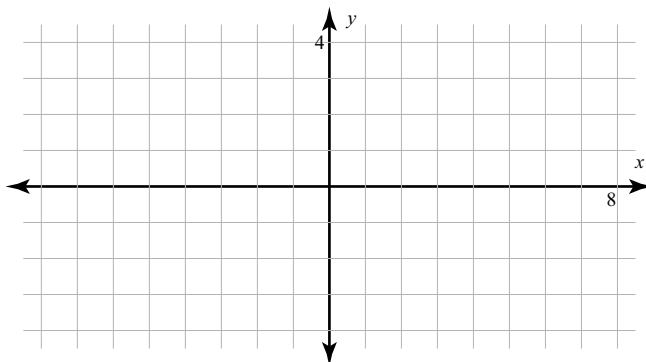


8. Suppose

$$f(x) = \begin{cases} -(x+3)^2 & \text{if } x \leq -2, \\ x & \text{if } -1 < x < 2, \\ \sqrt{x-2} + 2 & \text{if } 2 < x \leq 6. \end{cases}$$

(a) (4pts) State the domain of f using interval notation.

(b) (10pts) Sketch a graph of f and label all endpoints and holes.



(c) (4pts) What are the x and y intercepts of f ?

[be sure to indicate which are x -intercepts and which are y -intercepts.]

(d) (4pts) State the range of f using interval notation.

Bonus: (10pts) Find the rule of f^{-1} where f is the one-to-one function with rule

$$f(x) = \begin{cases} x+2 & \text{if } -2 \leq x < 0, \\ -x^2 & \text{if } x \geq 2. \end{cases}$$