## HW #2 Kerry Ojakian's MTH 30 Class Due Date: Thursday April 3 (beginning of class)

## General Instructions:

- Homework must be stapled, be relatively neat, and have your name on it. All answers and work should be on this sheet.
- Use tutors, work with other students, but ... don't copy!

## The Assignment

1. Solve these absolute value equations:

(a) 
$$|x-5| = 20$$
 (b)  $|4x+7| = 15$ 

- 2. Solve these absolute value inequalities:
  - (a) 4|3x-5| < 40 (b)  $|4x+1| + 7 \ge 12$

3. Show that f(x) = -3x + 1 and  $g(x) = \frac{x-1}{-3}$  are inverses.

4. Find the inverse of the function  $g(x) = \frac{1}{x} + 1$ .

5. Consider the function f given by the following table.

x	2	4	6	10	15	17
f(x)	3	4	13	2	6	14

Use the table to evaluate each.

- (a) f(2) (b) f(10)(a)  $f^{-1}(14)$  (b)  $f^{-1}(4)$ (a)  $f^{-1}(2)$
- 6. Find the slope and y intercept of the lines.
  - (a) x 3y = -3 (b) x + y = 4
- 7. Find the slope of the line from the given points.
  - (a) (1,2) and (3,6) (b) (0,5) and (2,1)

8. Graph each equation.

(a) 
$$y = 3x + 1$$
 (b)  $y = 2x - 1$ 

9. Graph the following function.  $h(x) = \frac{1}{2}x + 1$ 

- 10. Consider the linear equation f(x) = (3/2)x 6. Find the slope of a line parallel to f. Find the slope of a line perpendicular to f.
- 11. Find the equation of the line passing through the point (1,3) that is parallel to the line with equation 3x + 2y = 5.

12. Write an equation for a line perpendicular to f(x) = 3x + 4 and passing through the point (3, 1).

13. Find the point of intersection between the lines, if it exists: 2x - 3y = 12 and 5y + x = 30.

- 14. Suppose we have a scatter plot of some data comparing hours spent studying with grade on an exam, where hours (t) is the independent variable. Suppose the best-fit line turns out to be this: G(t) = 20 + 15t
  - (a) According to this best fit line, what will your grade be if you do not study at all?
  - (b) How much do you need to study to get 100?

15. Write the parabola  $h(x) = (x-2)^2 + 1$  in in general form.

16. Write the parabola  $g(x) = x^2 - 12x + 32$  in vertex form.

- 17. Consider  $y = x^2 + 5x + 6$ .
  - (a) Find all intercepts.
  - (b) Find the point on the graph with maximum y (or explain if none).
  - (c) Find the point on the graph with minimum y (or explain if none).
  - (d) Graph the equation.

- 18. For the quadratic function  $f(x) = 2x x^2 2$ 
  - (a) Find its vertex
  - (b) Find its x- and y-intercepts.
  - (c) Give the equation of the axes of symmetry.
  - (d) Draw the graph.
  - (e) Determine its domain and range.

- 19. The number of people (P) infected t days after a flu outbreak is modeled by  $P = -t^2 + 100t + 20$ .
  - (a) How many days after outbreak is the maximum number sick?
  - (b) What is that maximum number of people infected at once?

20. Determine the end behavior of the functions.

(a) 
$$g(x) = -90x^2$$
 (b)  $f(x) = 5x^3$ 

- 21. Determine the end behavior of the function  $f(x) = 3x^3 + 7x^4 17x$ .
- 22. Suppose a polynomial function has exactly 5 intercepts. What is the least possible degree of the function?
- 23. Show that the polynomial function  $f(x) = x^3 9x$  has a zero between x = -4 and x = -2.

24. Graph  $g(x) = 2(x-5)^3(x+1)^2$ . Find its zeroes and the multiplicity of each.

25. Graph a polynomial function of degree 5 with a root of multiplicity 2 at -3, a root of multiplicity 2 at 2, and a final root at -2. It has a *y*-intercept at (0, -3).

- 26. What is the remainder you would get it you divide the polynomial  $f(x) = x^{103} + x^{50} + 2$  by (x-1)?
- 27. Is (x+1) a factor of  $x^5 2x^4 x + 2$ ?
- 28. Find the possible rational zeros of the polynomial  $6x^4 + 3x^2 + 4x 15$

29. Divide  $\frac{3x^6 - 2x^3 - 7x^2 - 2}{x^2 - x + 2}$  using long division. Write your answer in the form  $\frac{N(x)}{d(x)} = q(x) + \frac{r(x)}{d(x)}$ , where N is the divident, d is the divisor, q is the quotient, and r is the remainder.

30. Solve the equation  $2x^3 - 3x^2 - 11x + 6 = 0$  given that -2 is a zero of  $f(x) = 2x^3 - 3x^2 - 11x + 6$ .

31. Solve.  $x^3 - 4x^2 - 7x + 10 = 0$ . Then use that result to easily factor  $x^3 - 4x^2 - 7x + 10$ .