1. Graph each of the following functions.

   (a) $f(x) = |x| - 4$

   (b) $f(x) = |x - 4|$

   (c) $f(x) = -|x| + 4$

2. Suppose that $f(x)$ is a function given by $f(x) = -x^2 + 10x - 1$. Find the value of

   (a) $f(0) =$

   (b) $f(3) =$

   (c) $f(-3) =$

   (d) $\dfrac{f(-3)}{f(3)} =$

   (e) $f\left(5 - \sqrt{2}\right) =$

   (f) Find all values of x with $f(x) = 0$

3. Factor each of the following by completing the square or state if it does not factor.

   (a) $x^2 - 6x + 5 =$

   (b) $x^2 - 6x + 9 =$

   (c) $x^2 - 6x + 13 =$

   (d) $x^2 - 6x + 7 =$

   (e) $1560x^2 - 26\,598x + 78x^3 =$

   (f) $3x^2 - 14x - 5 =$

4. Completely factor each of the following expressions.

   (a) $ab^2 - 6a^3 + a^2b =$

   (b) $10xy - 4a^2 + 25x^2 + y^2 =$

   (c) $3a^6b - 243a^2b =$

   (d) $12ax - 4ay + 24bx - 8by =$

   (e) $34x - 6x^2 + 12 =$

5. Find the domain of each of the following functions.

   (a) $f(x) = x + 3$

   (b) $f(x) = \sqrt{x + 3}$

   (c) $f(x) = \dfrac{1}{x + 3}$

(d) $f(x) = \dfrac{1}{x^2 - 7x - 8}$

6. Simplify each of the following expressions.

(a) $\dfrac{(-x^{-4})^{-2} x^3 y^0 (-yxy^{-2}x^{-2})^{-3}}{2x^2 (-2x^{-4}y)^{-3} yx^0} =$

(b) $\dfrac{x^2 - 5x}{x^2 - 2x - 15} \cdot \dfrac{x^2 - 9}{x^2 - 3x} =$

(c) $\dfrac{3a^2xy^3 - 3b^2xy^3 + 3a^2x^2y^2 - 3b^2x^2y^2}{6ax^4y - 6bx^4y - 6ax^2y^3 + 6bx^2y^3} =$

(d) $\dfrac{1}{2 - \dfrac{1}{x-4}} =$

(e) $\dfrac{x^2 - 3x}{x^2 + 4x - 21} \cdot \dfrac{6x + x^2 - 7}{x^2 - x} =$

(f) $\dfrac{2ax - 3b - 3a + 2bx}{a^2 - b^2} \div \dfrac{2x^2 - x - 3}{3b - 3a + ax - bx} =$

(g) $\left(7 - 3\sqrt{2}\right)^2 =$

(h) $\left(6 - 5\sqrt{2}\right)\left(6 + 5\sqrt{2}\right) =$

(i) $\dfrac{2}{\sqrt{29} + 5} =$

(j) $\dfrac{4x - 9}{2\sqrt{x} - 3} =$

(k) $3\sqrt{8} + 2\sqrt{18} - \sqrt{50} =$

7. Find $f\left(2 - \sqrt{7}\right)$ if $f(x)$ is a function defined by $f(x) = 3x^2 - 12x - 3$.

8. Graph the functions $f(x) = 10x - x^2 - 16$ and $g(x) = 3x - 10$ in the same coordinate system. Find the coordinates of the point(s) where the graphs intersect.

9. Solve each of the following equations. Make sure to check your solutions.

(a) $\dfrac{5x+1}{28} + \dfrac{12x-6}{56} = \dfrac{x-1}{14}$

(b) $x^3 = 12x^2 + 3213x$

(c) $3|x+3| - 5 = 10$

(d) $2(x-3) - \dfrac{x}{2} = \dfrac{3}{2}(x-4)$

(e) $x^3 - 2x^2 - 35x = 0$

(f) $2x^2 - 32x = 0$

(g) $x^2 + 11 = 8x$

(h) $x^2 + 134 = 22x$

(i) $4x + x^3 = 6x^2$

(j) $3\left|\frac{1}{2}x - 5\right| + 1 = -8$

(k) $5 - (2 - x)(x + 3) = (x - 2)^2$

10. Solve each of the following inequalities. Graph the solution set.

(a) $(2 - 3x)(x - 5) \leq 4 - (x - 3)(3x + 2)$

(b) $\frac{5 - 4x}{3} - \frac{2x - 7}{5} > -2x + 2$

11. Word Problems.

(a) There is an animal farm where chickens and cows live. There are 68 heads and 252 legs. How many chickens, how many cows?

(b) The difference between two integers is 26. Their product is 1767. Fid these numbers.

(c) How many gallons of 12% solution must be mixed with 6 gallons of 20% solution to obtain a solution that is 15%?

(d) The population of a town has decreased from 75000 to 65250. What percent of a change does this represent?

(e) The sum of five times a number and -10 is 8 less than six times the sum of 7 and the opposite of the number. Find this number.

(f) We have invested \$8000 into two bank accounts: one earns 6% interest, the other one earns 9% interest. How much money did we invest into each account if the combined interest was \$660?

(g) The hypotenuse of a right triangle is 26 cm. The difference between the other two sides is 14 cm. Find the missing sides.

(h) Lisa took 5 exams. The first 4 received scores of 72, 93, 86, and 82. How much did she score on the fifth exam if her average score is 74 points?