1. Simplify:
   (a) $\left(\dfrac{x^{-1}y^2}{y^{-2}x^3}\right)^{-2}$
   (b) $\dfrac{\sqrt[3]{x^2}y^3}{\sqrt{y^2}x^5}$

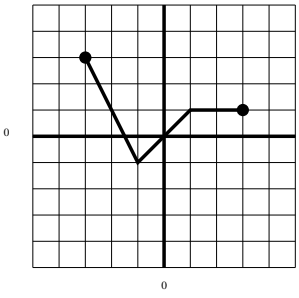
2. Find the domain of the following expression:

$$\frac{x^2+1}{x^3-3x^2-10x}$$

3. Find all solutions to the following equations or inequalities:
   (a) $\sqrt{x}-x^2=0$
   (b) $3x^2-17x+4=0$
   (c) $2x=x^2$
   (d) $(x-1)(x-2)(x-3)>0$
   (e) $|x-4|=5$

4. Give equations for lines fitting the following descriptions:
   (a) line perpendicular to the line $6x-3y+7=0$ and passing through point $(3,1)$
   (b) line passing through points $(2,0)$ and $(0,4)$
   (c) line parallel to the line $2x-6y=3$ and passing through point $(0,0)$

5. The graph of $y=f(x)$ is as shown.



   Sketch the graphs of the following functions:
   (1) $y=f(x)-2$ (2) $y=f(x+2)$ (3) $y=-f(x)$ (4) $y=1-f(x)$.

6. Put the following quadratic functions into standard form (i.e., express them as $f(x)=(x-h)^2+k^2$).
   (a) $x^2-10x+22$

(b) $3x^2 - 12x + 4$

Then for each parabola find:

- the vertex (the point at the bottom or top of the parabola)
- any x-intercepts (i.e., zeros/roots)
- the y-intercept
- the range of the function

7. A company sells bottles of hot sauce at a farmers market for \$5 per jar. On average they sell 36 jars per week. They estimate that each ten cent decrease in price will increase sales by 2 jars per week.
   (a) Find a function modeling weekly revenue in terms of the price.
   (b) Find the price to maximize weekly revenue.
   (c) According to the model, what price would be so high as to drive sales down to zero?

8. Find the following logarithms:
   (a) $\log_2 16$
   (b) $\log_9 \sqrt{3}$
   (c) $2^{\log_2 7}$

9. Find x:
   (a) $\log_3 x = 2$
   (b) $\log_4 x = 2$
   (c) $\log_2(2x - 1) = 3$

10. Use the laws for manipulating logarithms as specified:
    (a) (Expand) $\log_3(x\sqrt{y}z^2)$
    (b) (Combine) $\ln(a + b) + \ln(a - b) - \ln c$
    (c) (Expand) $\log \dfrac{x^2y^3}{z^5w^4}$

11. Solve the following equations. Give exact answers (which will need to be in terms of logarithmic or exponential functions).
    (a) $e^{2x} = 7$
    (b) $5^x = 4^{x+1}$
    (c) $\log(x - 4) = 2$

12. The half-life of strontium-90 is 28 years. How long will it take a 50-mg sample to decay to a mass of 32 mg?

13. In a particularly bad zombie outbreak in Freaktown, the population of zombies was 100,000 in 2050, and 300,000 in 2055. Assuming that the zombie population grows exponentially,
    (a) Find a function that models the zombie population t years after 2050.
    (b) Find the time require for the population to double.
    (c) Predict the zombie population in 2075.

14. Suppose \$1000 is invested in an account earning 8% annual interest.
    (a) How much money is in the account after two years if the money is compounded once per year?
    (b) How much money is in the account after two years if the money is compounded monthly?
    (c) How much money is in the account after two years if the money is compounded continuously?
    (d) If the money is compounded continuously, how long does it take for it to grow to \$1500?

15. (a) $7\pi/12$ radians is _____ degrees.
    (b) π radians is _____ degrees.
    (c) $3\pi/2$ radians is _____ degrees.
    (d) 2 radians is _____ degrees.
    (e) 120 degrees is _____ radians.
    (f) 333 degrees is _____ radians.

16. Give the *exact* values of the following trigonometric functions.
    (a) $\tan(\pi)$
    (b) $\cos(3\pi/4)$
    (c) $\csc(-\pi/6)$
    (d) $\sin(3\pi/2)$

17. Let $A = \sin(\pi/11)$. Express the following trigonometric functions in terms of A. (For example, if the question asked you to give $\csc(\pi/11)$, the answer would be $1/A$.)
    (a) $\sin(10\pi/11)$
    (b) $\sin(-\pi/11)$
    (c) $\sin(21\pi/11)$
    (d) $\cos(\pi/11)$
    (e) $\cot(12\pi/11)$

18. From the top of a 200-foot lighthouse, the angle of depression down to a ship is 19 degrees (i.e., from the lighthouse you must tilt your head downward 19 degrees to see the ship). How far is the ship from the base of the lighthouse?

19. A right triangle has an angle of 35 degrees. If the hypotenuse has length 15, what are the lengths of the other two sides?

20. Give all solutions for θ between 0 and 2π to the following equations:

    (a) $\sin\theta = .9$

    (b) $\cos\theta = -.2$

21. Walking in straight lines in a forest with no change in elevation, a hiker starts at point A and walks 1.2 km to point B. Then she walks 1.8 km to point C. Finally she returns to point A, going a distance of 0.8 km.

    Standing at point A, she looks out at points B and C and measures the angle between them. What is it?

22. Suppose a triangle has angles of 35 and 45 degrees and the side opposite the 45-degree angle has length 2. What are the lengths of the other two sides?