1. Completely simplify the following. Assume that the variables may be either positive or negative.
   (a) $\sqrt{100x^2}$ 
   (b) $\sqrt{x^2 + 8x + 16}$

2. Completely simplify the following. You do not need to use any absolute values.
   (a) $\sqrt{18x^3y^8}$ 
   (b) $\sqrt[3]{16x^4y}$

3. Find the domain of the following functions.
   (a) $f(x) = \sqrt{5-x}$ 
   (b) $f(x) = \sqrt[3]{x-4}$

4. Simplify the following. The final answers should be written using only positive exponents, not radical signs.
   (a) $\frac{\sqrt{xy^3}}{\sqrt{xy}}$ 
   (b) $\left(27x^3y^{-2/3}\right)^{-1/3}$

5. Rationalize the denominator.
   (a) $\frac{2}{1 + \sqrt{3}}$ 
   (b) $\frac{2}{\sqrt[3]{3x^2y^2}}$

6. Simplify the following. You do not need to use any absolute values.
   (a) $(3 - 2\sqrt{3})^2$ 
   (b) $5\sqrt{12x^3} - 3x\sqrt{3x} + 5\sqrt{x}$

7. Simplify the following.
   (a) $(3 - 2i)^2$ 
   (b) $\frac{3 - 2i}{3 + 4i}$

8. Find the midpoint of the line segment connecting $\left(\frac{2}{3}, \frac{1}{2}\right)$ and $\left(-\frac{1}{3}, \frac{1}{6}\right)$.

9. During the summer heat, a 2000 meter bridge expands by 1 meter, with the bulge occurring in the middle. How high is the bulge?

10. The sides of an equilateral triangle are 8 feet. What is the area of the triangle?

11. The distance from the point $(3, 4)$ to the point $(x, 12)$ is 10. Find all possible values of $x$.

12. Solve $\sqrt{2x - 1} + \sqrt{x + 3} = 3$