Precalculus Section 1.4 Exercises

1. Find an expression for the function $f(x)$ that takes a real number x and performs the following steps in the order given: (1) square the number; (2) subtract 9; (3) take the square root; (4) make the quantity a feaction with numerator 7.

2. For the function $f(x) = \sqrt{x-2}$, find and simplify

   - $f(5)$,
   - $f(x-7)$,
   - $f(x) - f(7)$,
   - $f(x) - 7$,
   - $f(7x)$,
   - $7f(x)$,
   - $f(x^2)$, and
   - $f(\frac{2}{a})$

   Then find $f(0)$ and solve the equation $f(x) = 0$.

3. Find the domain of the following functions

   (a) $f(x) = \dfrac{\sqrt{3x-5}}{x^3-27}$

   (b) $f(x) = \sqrt[3]{\dfrac{2x}{3x+4}}$

   (c) $f(x) = \dfrac{7x^2}{\frac{1}{x} - \frac{2}{3}}$

4. The volume V of a cone whose height and radius are equal is a function of the radius r, when measured in inches. This relation is expressed by the formula $V(r) = \frac{1}{3}\pi r^3$. Find $V(3)$ and solve $V(r) = \frac{8\pi}{3}$. Interpret your answers to each. Why is r restricted to $r > 0$?

5. You and your friends are printing t-shirts for broomball and are looking at an online t-shirt printing service. The website says that it will charge shipping costs according to the following formula.

$$C(n) = \begin{cases} 5 & n \leq 20 \\ .35n & 20 < n \leq 100 \\ 35 & 100 < n \end{cases}$$

   where $C(n)$ (in dollars) is the cost to ship n t-shirts. How much shipping will they charge if you order 12 t-shirts? What is the applied domain of $C(n)$? That is, for which values of n does the function $C(n)$ have a real-world interpretation?