1. Find the domain of each of the functions below:
   
a. \( f(x) = \sqrt{\frac{x^2-16}{x-7}} \)  
b. \( g(x) = \frac{x^3-1}{(x+5)^{\frac{4}{3}}x^2-2x-3} \)

2. If \( \cot \theta = -\frac{11}{4} \) and \( \sin \theta < 0 \),
   a. Find the values of \( \sin \theta \), \( \cos \theta \), \( \tan \theta \), \( \csc \theta \), \( \sec \theta \).
   b. Find the value of \( \sin 2 \theta \).

3. If \( 0 \leq x \leq \frac{\pi}{2} \), \( 0 \leq y \leq \frac{\pi}{2} \), \( \cos x = \frac{3}{5} \) and \( \csc y = \frac{9}{2} \), find the values of
   a. \( \sin (x - y) \)
   b. \( \cos (x - y) \)

4. Solve the following equations, for \( 0 \leq x \leq 2\pi \):
   a. \( 2 \cos^2 x + \sin x - 1 = 0 \)
   b. \( \cos 2x = -\cos x \)

5. Given the two points \( A(1, 5) \) and \( B(2, -3) \), find the vectors \( \overrightarrow{AB} \) and \( \overrightarrow{BA} \).

6. Given the vectors \( \vec{a} = \langle -3, 1 \rangle \), \( \vec{b} = -7\vec{i} \) and \( \vec{c} = \langle 2, 5 \rangle \). Compute the following:
   a. \( 2\vec{a} - 3\vec{b} + \vec{j} \)
   b. \( |-3\vec{a} + 2\vec{c}| \)
   c. A unit vector in the direction of \( \vec{a} \)
   d. A vector 3 units long in the direction of \( -\vec{c} \)
   e. Find constants \( s \) and \( t \) so that \( \vec{c} = s\vec{a} + t\vec{b} \)

7. Two forces, \( \overrightarrow{F_1} \) and \( \overrightarrow{F_2} \), are acting on an object \( P \). Force \( \overrightarrow{F_1} \) has magnitude 5 pounds and acts in the direction of the positive y-axis. Force \( \overrightarrow{F_2} \) has magnitude 7 pounds and acts at a 60° angle with the positive x-axis. Find the magnitude and direction of the resulting force acting on \( P \).

8. Two children are pulling a toy cart, and they are moving it in a perfectly straight line \( \ell \) along the longer side of the cart. One child applies a force of 3 pounds at a 30° angle to \( \ell \), and the other child applies a force of 5 pounds at an angle \( \theta \) to \( \ell \). Find the angle \( \theta \).

9. A ship leaves port at noon and heads due west at 20 knots, or 20 nautical miles (nm) per hour. At 2 P.M. the ship changes course to N 54°W. Find the ship’s bearing and distance from the port of departure at 3 P.M.

10. Given the vectors below, sketch the vectors \( \overrightarrow{a} + \frac{1}{2} \overrightarrow{b} \), \( \overrightarrow{a} - \frac{1}{2} \overrightarrow{b} \) and \( \overrightarrow{b} - \overrightarrow{a} \).