Math 141 Worksheet 1

Show all work for full credit.

1. Find the domain.
   \[ f(x) = \sqrt{x + 7} - \sqrt{x^2 - 9} \]

2. Find \( (f \circ g)(x) \) and its domain.
   \[ f(x) = \sqrt{4 - x^2} \quad g(x) = \frac{1}{\sqrt{x}} \]

3. Find \( (f \circ g)(x) \) and its domain.
   \[ f(x) = \sqrt{3 - x^2} \quad g(x) = \sqrt{x - 2} \]
4. Express the following functions as the composition of three functions. That is, find functions \( f, g, \) and \( h \) such that \( F(x) = f(g(h(x))) \). 

**NOTE:** You may not choose \( y = x \) as one of your functions.

a. \( F(x) = \sqrt{1 + \sin^3(x)} \) 

b. \( F(x) = \ln(\cos^5 x) \)

5. Evaluate each of the following exactly. Remember to give your answer in radians.

a. \( \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) \)

b. \( \tan^{-1}(1) \)

c. \( \sin^{-1}\left(-\frac{1}{2}\right) \)

d. \( \cos^{-1}(-1) \)

e. \( \sin^{-1}\left(\frac{1}{\sqrt{2}}\right) \)
6. Determine whether the following functions are even, odd, or neither. You must explain your answers.
   a. \( f(x) = \frac{x^2+1}{x^4-2} \)

   b. \( f(x) = \frac{2x+1}{x-1} \)

7. Find \( f(f(x)) \) and simplify.

   \[
   f(x) = \frac{2x + 1}{x + 3}
   \]