All questions except number 5 come from the course text.

1. Let \( f(x) = \sqrt{x + 2} \) for \( x \geq -2 \). Find the inverse of \( f(x) \) for \( x \geq -2 \) and write it in the form \( y = f^{-1}(x) \). Then, verify the relationships \( f(f^{-1}(x)) = x \) and \( f^{-1}(f(x)) = x \). (Section 1.3, exercise 27)

2. The unit circle \( x^2 + y^2 = 1 \) consists of four one-to-one functions, \( f_1(x), f_2(x), f_3(x), \) and \( f_4(x) \) (see figure).
   1. Find the domain and a formula for each function.
   2. Find the inverse of each function and write it as \( y = f^{-1}(x) \).

   (Section 1.3, exercise 29)

3. Solve the following equations:
   - \( \log_{10} x = 3 \).
   - \( \log_8 x = \frac{1}{3} \).
   - \( \ln x = -1 \).

   (Section 1.3, exercises 41, 43, 45)

4. Without using a graphing utility, sketch the graph of \( y = 2^x \). Then on the same set of axes, sketch the graphs of \( y = 2^{-x}, y = 2^x - 1, y = 2^x + 1, \) and \( y = 2^{2x} \). (Section 1.3, exercise 72)

5. (*) A particular factory produces organic, artisanal garbage; denote by \( x \) the number of units of garbage the factory produces in a given day.
   1. Suppose the total cost to the factory of producing \( x \) units a day is \( C(x) = 36x + 260 \) dollars, and that the total projected revenue from producing \( x \) units a day is \( R(x) = -2x^2 + 104x - 220 \). Find the projected daily profit from producing \( x \) units per day.
   2. Determine the number of units of artisanal garbage the factory should produce each day to maximize its profit.

6. (*) Prove that, if \( b > 0, c > 0, b \neq 1, c \neq 1 \), then \( \log_b c)(\log_c b) = 1 \). (Section 1.3, exercise 91)
7. Sketch a function that is one-to-one and positive for \( x \geq 0 \). Make a rough sketch of its inverse.  
(Section 1.3, exercise 5)

8. Solve the equation \( 3^{3x-4} = 15 \) (Exercise 55)

9. Use the graph of \( f \) in the figure below to find the following values or state that they do not exist. If a limit does not exist, explain why.

\[
\begin{align*}
1. & \quad f(1); \\
2. & \quad \lim_{x \to 1^-} f(x); \\
3. & \quad \lim_{x \to 1^+} f(x); \\
4. & \quad \lim_{x \to 1} f(x);
\end{align*}
\]

(Section 2.2, exercise 21)