1. Let \( f(x) = \sqrt{x + 2} + 1 \). Find all numbers \( x \), if there are any, such that \( f(x) = -2 \).

2. Graph: \( f(x) = \begin{cases} 2 & \text{if } x < -3 \\ |x + 1| & \text{if } -3 \leq x \leq 2 \\ -(x - 2)^2 + 4 & \text{if } x > 2 \end{cases} \)

3. Find the domain of the function given by: \( f(x) = \ln\left(\frac{x - x^2}{x + 2}\right) + e^{-(x+3)} \)

4. Let \( f(x) = \sqrt{x + 5} \) and \( g(x) = \frac{x}{x - 2} \). Find and simplify completely:
   
   \( \frac{g \circ f(4)}{f \circ f(11)} \) (a) \hspace{1cm} \frac{g(x + h) - g(x)}{h} \) (b)

5. Let \( f(x) = 5 \frac{x}{3} - 1 \). Find \( f^{-1}(24) \), where \( f^{-1} \) is the inverse function of \( f \).

6. For each part, give a function \( f \), by writing a formula for \( f(x) \), that satisfies the given conditions:

   (a) The function \( f \) is an exponential function such that \( f(-2) = \frac{4}{9} \)

   (b) The function \( f \) is a function whose inverse function has domain \([-1,1]\] and range \([0,\pi]\)
7. Give a reasonable formula for each function whose graph is shown here:

(a) $y = f(x)$

(b) $y = f(x)$

8. Find a linear function $f$ whose graph is perpendicular to the line $2x + 3y - 1 = 0$ and such that $f^{-1}(1) = 4$.

9. The sum of two numbers $x$ and $y$ is 26.
(a) Express the product $P$ of the numbers as a function of $x$.

(b) Find the maximum product $P$ of the numbers.

10. Graph $f(x) = x^3 - 4x$, finding and labeling all intercepts and asymptotes, if any.

11. Let $f(x) = (2x^2 - 4)(x^2 + 2x) + 2(2x^2 - 4)$. Find all numbers $x$, if there are any, such that $f(x) = 0$. Express any non-real roots in the form $a + bi$.

12. The resistance $R$ of a wire varies directly as its length $L$ and inversely as the square of its diameter $D$.
   
   (a) Write an equation that expresses the variation.

   (b) Find the constant of proportionality when a piece of wire that is 25 meters long and 0.05 meters in diameter has a resistance of 300 ohms.

13. Graph $f(x) = \frac{2x - 8}{7 - x}$, finding and labeling all intercepts and asymptotes, if any.
14. Graph \( f(x) = \ln(e - x) - 1 \), finding and labeling all intercepts and asymptotes, if any.

15. Given the approximate values \( \ln(4) \approx 1.4 \) and \( \ln(12) \approx 2.5 \), find:
   (a) \( \ln(16) \)
   (b) \( \ln\left(\frac{1}{7}\right) \)

16. Let \( f(x) = \log_{16}(x + 2) + \log_{16}(x + 3) \). Find all numbers \( x \), if there are any, such that \( f(x) = \frac{1}{4} \).

17. A population of bacteria grows exponentially according to the function \( A(t) = A_0 e^{rt} \), where \( A(t) \) is the number of bacteria present after \( t \) hours and \( A_0 \) is the initial number of bacteria. If \( r = 0.08 \), how long will it take for the initial number of bacteria to double? Simplify your answer by using the approximation \( \ln(2) \approx 0.64 \).

18. Find the exact value, if it exists:
   (a) \( \cos\left(-\frac{13\pi}{4}\right) \)
   (b) \( \csc\left(-\frac{5\pi}{6}\right) \)

19. Place each of the given numbers on the number line shown below. (Copy the number line on your answer sheet.)
   (a) \( \sin(3) \)
   (b) \( \tan\left(\frac{\pi}{2}\right) \)
   (c) \( \cos(3) \)
   (d) \( \log_3(e) \)

20. If \( \csc(\theta) = -\sqrt{5} \) and \( -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2} \), find \( \tan(\theta) \).

21. Let \( g(x) = 3 \sin\left(2x + \frac{\pi}{2}\right) \). Graph \( g \) over one complete cycle, labeling the intercepts and asymptotes, if any.

22. Find all primary solutions (i.e. \( 0 \leq \pi < 2\pi \)) of \( 2\sin^2(x) + 7\cos(x) - 5 = 0 \).

23. Find the exact value, if it exists:
   (a) \( \arccos\left(-\frac{1}{2}\right) \)
   (b) \( \arctan[\tan(\frac{3\pi}{4})] \)

24. Prove the identity: \( \frac{2}{\sin(2x)} = \frac{\sec(x) + \csc(x)}{\sin(x) + \cos(x)} \)

25. Find the polar coordinates \((r, \theta)\) with \( r > 0 \), \( 0 \leq \theta < 2\pi \) for the point given by the rectangular coordinates \((-3, \sqrt{3})\).