1. (7 pts.) Simplify by adding (or subtracting) like terms wherever possible:
\[ 12\sqrt{x+1} + 3x^4 - x^8 - \pi x^4 - 4\sqrt{x+1} + 2\sqrt{x^2 + 1} \]

2. (7 pts.) Simplify completely:
\[ \frac{\sqrt[3]{3x^5 y^{-4} z^7}}{\sqrt[3]{24xy^{-1} z^9}} \cdot \frac{\sqrt[3]{x^{-7} y^3 z^2}}{\sqrt[3]{z^9}} \]

3. (7 pts.) Multiply and simplify completely: 
\[ \left( \sqrt[3]{63} + \sqrt[3]{28} \right)^3 \]

4. (7 pts.) Simplify completely:
\[ \frac{64^{-\frac{1}{3}}}{64^{-\frac{1}{3}} - 64^{-\frac{1}{6}}} \]

5. (6 pts.) Solve: 
\[ 2|2x + 3| + 4 > 5 \]

6. (6 pts.) Solve: 
\[ |x + 5| = |x - 5| \]

7. (7 pts.) In the year 2009, Baltimore had one-half the snowfall of Washington, D. C. and Philadelphia had 11 inches more than one-third the snowfall of Washington, D. C. If the total snowfall in the three cities combined was 77 inches, what was the snowfall in each of the cities?

8. (7 pts.) Solve for \( a : \frac{2}{a} + \frac{a + 7b}{ab} = 3 \)

9. (6 pts.) Let \( g \) be the function given by 
\[ g(t) = \sqrt{3 - \frac{t^2 - 9}{3\sqrt{t} + 9}} \]

What is the domain of \( g \) ?

10. (6 pts.) Let \( f \) be the function given by 
\[ f(x) = -x^2 - 2\|x\| \]

Find and simplify \( 2f(-1) - f(2) \).
11. (7 pts.) Let \( f \) be the function given by \( f(x) = x(x+1) \).

Find and simplify \( \frac{f(x+1) - f(x)}{2} \).

12. (6 pts.) Find the equation of the line shown here.

13. (6 pts.) Find the equation of the line that is perpendicular to \( 2x + 5y = 10 \) and passes through the point \((5, -7)\).

14. (7 pts.) A rectangle has a diagonal measuring 20 cm. The length of the rectangle is three times the width of the rectangle. Find the exact perimeter of the rectangle.

15. (7 pts.) Solve, writing any non-real solutions in the form \( a + bi \): \( (x^2 + 2x + 2)(x^2 - 7) = 0 \)

16. (7 pts.) Graph, labeling the vertex and all \( x \) and \( y \) intercepts: \( f(x) = -x^2 + 4x + 5 \)

17. (7 pts.) Simplify completely: \( \frac{2}{x-3} - \frac{6}{x^2-3x} + 1 \)

18. (7 pts.) Solve: \( \sqrt{x-2} - x = -4 \)
19. (7 pts.) Let \( f(x) = x(x+5)(x-3) \). Find all inputs, \( x \), such that \( f(x) > 0 \).

20. (7 pts.) Solve: \( \frac{x+8}{x+2} \geq 1 \)

21. (7 pts.) The graph of a function, \( f \), is shown here.

   a) What is the domain of \( f \)?
   b) What is the range of \( f \)?
   c) Find all \( x \) such that \( f(x) = 1 \).

22. (7 pts.) Solve: \( \left(2 + \sqrt{x}\right)^2 - 5(2 + \sqrt{x}) = 6 \)

23. (6 pts.) Find: a) \( \log_5(625) \) b) \( \log_{49}\left(\frac{1}{7}\right) \) c) \( \log_{10}\left(\frac{1}{1000}\right) \)

24. (6 pts.) Using the approximate values \( \log_7(4) = 0.7 \) and \( \log_7(12) = 1.3 \) find:

   a) \( \log_7(16) \) b) \( \log_7\left(\frac{1}{3}\right) \) c) \( \log_7(84) \)

25. (7 pts.) Solve: \( \log_3(2x + 1) - 3 = -\log_3(x - 1) \)

26. (7 pts.) Sketch the curve given by \( 5x^2 + 5y^2 = 25 \).

27. (7 pts.) Arrange the following numbers in order from smallest to largest:

   \( \log_3(4) \) \( \sin(6) \) \( \cos(6) \) \( -\frac{\pi}{4} \)

28. (6 pts.) a) Convert to radians: \( \left(\frac{30}{\pi}\right)^\circ \)

   b) Convert to degrees: \( \frac{\pi}{9} \) radians
29. (6 pts.) For the right triangle shown here, find:
   a) \( \tan(< A) \)
   b) \( \sin(< A) \)

30. (7 pts.) Ernest covers 30 miles on the expressway, going at a constant rate of speed. Steven can cover 40 miles on the expressway in the same amount of time, going at a speed that is 17 mph faster than Ernest’s speed. Find the speed of each driver.