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

2. (7 pts.) Simplify completely: \( (16^{-\frac{1}{2}} + 4^{-\frac{1}{2}})^2 \)

3. (7 pts.) Simplify completely:
\[ \frac{(x + 2)(x + 3) + (x + 1)(x + 3)}{(x + 2)(x + 3)} \]

4. (7 pts.) Solve:
\[ \frac{x + 2}{4} - \frac{x - 1}{3} = x - 10 \]

5. (7 pts.) Solve for \( n \):
\[ \frac{5}{2n + 1} = \frac{m}{n} \]

6. (7 pts.) The perimeter of a triangular garden is 60 feet. Find the length of the three sides if one side is 4 feet greater than twice the length of the smallest side and the third side is 4 feet less than 3 times the length of the smallest side.

7. (7 pts.) Simplify completely:
\[ \left( \frac{-3^{-\frac{1}{2}} x^{-4}}{y^{-1}} \right) \left( \frac{y^5 z^0}{x^{-1}} \right)^{-1} \]

8. (6 pts.) Solve and graph the solution set:
\[ \frac{-5x - 1}{-4} \geq \frac{2x + 1}{-4} \]

9. (7 pts.) The graph of a function, \( f \), is show here.
   a) What is the domain of \( f \)?
   b) What is \( f(0) \)?
   c) For what values of \( x \) does \( f(x) = 1 \)?

10. (6 pts.) Let \( g \) be the function given by \( g(x) = \frac{4x}{\sqrt[3]{x - 3}} \). What is the domain of \( g \)?

11. (7 pts.) Graph the function \( f(x) = |x| - 1 \). Label three points.

12. (7 pts.) Let \( g(x) = 2x^2 + 2x \). Find and simplify \( g(-2) + 3g(2) \).

13. (6 pts.) Find the equation of the line that is perpendicular to the line \( 2x - 5y = 7 \) and passes through the point \((2, -1)\).

14. (6 pts.) Find the equation of the line that goes through the points \((2, -1)\) and \((2, 5)\).
15. (7 pts.) The sum of the squares of two consecutive even integers is 340. Find all even integers that satisfy this.

16. (7 pts.) Solve: \[ \begin{cases} x + 2y = -2 \\ 2x = -5 - 4y \end{cases} \]

17. (6 pts.) Factor completely: \[ 6x^4 + 9x^3 + 3x^2 \]

18. (6 pts.) Solve: \[ 12x^7 = 27x^5 \]

19. (7 pts.) Simplify: \[ \frac{4(x+1)^2 z^5}{32(x+1)^3 z^2} \]

20. (7 pts.) Solve: \[ 3 - \frac{2}{3a} = \frac{3a}{a - 1} \]

21. (7 pts.) Bonnie and Clyde go cross-country skiing. Clyde’s speed is 4 miles per hour greater than Bonnie’s speed. Clyde can travel 20 miles in the same time that Bonnie goes 12 miles. Find each person’s speed.

22. (6 pts.) Simplify completely:
   \[ a) \frac{64^{1/4}}{64^{5/12}} \quad b) \left( \frac{2^{15}}{4^{3/4}} \right) \]

23. (6 pts.) Simplify completely: \[ \sqrt{48} + 5\sqrt{12} - 3\sqrt{27} \]

24. (7 pts.) Solve: \[ \sqrt{1} - x - x = 5 \]

25. (7 pts.) The length of the hypotenuse of an isosceles right triangle is 10 cm. Find the length of the two legs. (Hint: An isosceles triangle has two equal sides.)

26. (6 pts.) Simplify completely: \( (2\sqrt{5} i + 3)^2 \)

27. (7 pts.) Solve, writing any non-real solutions in the form \( a + bi \): \[ 2x^3 - 8x^2 = -12x \]

28. (7 pts.) Graph, labeling the vertex and all \( x \) and \( y \) intercepts: \( f(x) = -x^2 - 4x - 3 \)

29. (7 pts.) Solve: \[ 4x^2 < 9 \]

30. (6 pts.) Find: a) \( \log_{32} \left( \sqrt[5]{5} \right) \)  b) \( \log_4 (2) \)  c) \( \log_{27} \left( \frac{1}{3} \right) \)