1. (7 pts.) Simplify by adding (or subtracting) like terms wherever possible:

\[ 2x^2 + \sqrt{5}x + \sqrt{x} + \pi x^2 - 7\sqrt{x} + \sqrt{5}x \]

2. (7 pts.) Simplify completely:

\[ (-2x^{-2}y^4) \left( \frac{y^6z^{-4}}{4x^2y^5z} \right) \]

3. (7 pts.) Simplify completely:

\[ (2\sqrt{2} + \sqrt{3})(3\sqrt{2} - 4\sqrt{3}) \]

4. (7 pts.) Simplify completely:

\[ \left( 4^{-\frac{3}{2}} - 4^{-\frac{1}{2}} \right)^2 \]

5. (6 pts.) Solve:

\[ |3x - 2| = |5 - 3x| \]

6. (6 pts.) Solve:

\[ 5 - 2 \left| \frac{x + 1}{2} \right| \leq 7 \]

7. (7 pts.) Solution A is 50% alcohol. Solution B is 20% alcohol. We want to create a 20 liter mixture of the two solutions that will be 32% alcohol. How many liters of each solution should be used?

8. (7 pts.) Solve for \( n \):

\[ 2m - 1 = \frac{1}{m} + \frac{1}{n} \]

9. (6 pts.) Let \( f \) be the function given by

\[ f(x) = \frac{x + 1}{x^2 - 4x + 3} \]

What is the domain of \( f \)?

10. (6 pts.) Let \( g \) be the function given by

\[ g(x) = \sqrt{x^2 - 5x + 9} \]

Find and simplify \( g(0) + [g(1)]^2 \).

11. (7 pts.) Let \( f \) be the function given by

\[ f(x) = x^2 + x + 1 \]

Find and simplify \( \frac{f(a) - f(a + 2)}{2} \).
12. (6 pts.) Find the equation of the line that is perpendicular to the line \( y = -1 \) and passes through the point \((3, -2)\).

13. (6 pts.) Find the equation of the line that is parallel to the line \( 3y + 4x = 0 \) and passes through the point \((1, -5)\).

14. (7 pts.) Three consecutive even integers are such that twice the square of the third integer is 104 more than the product of the first two integers. What are the three integers?

15. (7 pts.) Solve, writing any non-real solutions in the form \( a + bi \): \[4x^5 + 20x^3 = 16x^4\]

16. (7 pts.) Graph, labeling the vertex and all \( x \) and \( y \) intercepts: \[g(x) = -x^2 - 4x - 3\]

17. (7 pts.) Simplify completely: \[1 - \frac{10}{a^2 - 2a} - \frac{5}{2 - a}\]

18. (7 pts.) Let \( f \) and \( g \) be the functions given by \( f(x) = \sqrt{3x + 3} \) and \( g(x) = \sqrt{x + 2} \). Find all inputs, \( x \), such that \( f(x) - g(x) = 1 \).

19. (7 pts.) Solve: \( 2x(x + 3)^2 < 0 \)

20. (7 pts.) Solve: \[\frac{1}{x+3} \geq \frac{1}{x-4}\]

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) What is \( f(3) \)?
   d) Find all \( x \) such that \( f(x) = 0 \).
22. (7 pts.) Solve, writing any non-real solutions in the form $a + bi$: $(x^2 + 4)^2 - 4(x^2 + 4) - 5 = 0$

23. (6 pts.) Find: a) $\log_{\frac{1}{16}} \left( \frac{1}{2} \right)$  b) $\log_{12} \left( \frac{1}{144} \right)$  c) $\log_3 (81)$

24. (6 pts.) Using the approximate values $\log_{10}(7) = 0.8$ and $\log_{10}(28) = 1.4$ find:
   a) $\log_{10} \left( \frac{1}{4} \right)$  b) $\log_{10}(49)$  c) $\log_{10}(280)$

25. (7 pts.) Let $f$ be the function given by $f(x) = \log_3 (x + 5) + \log_3 (x + 7)$.
   Find all $x$ such that $f(x) = 1$.

26. (7 pts.) Identify and sketch the curve given by $12(x + 5)^2 + 3(y - 4)^2 = 12$.

27. (7 pts.) Arrange the following numbers in order from smallest to largest:
   $\log_3(10)$  $\sin (5.1)$  $\cos (0.4)$  $\tan (\pi)$

28. (6 pts.) a. Convert to radians: \( \frac{300}{\pi} \)
   b. Convert to degrees: $\frac{3}{2}$ radians

29. (6 pts.) For the triangle shown here, find an exact value for $x$:

![Triangle Diagram]

30. (7 pts.) The current in a river is 2 miles per hour. A small boat can travel 32 miles upstream and then 24 miles downstream in a total time of 6 hours. Find the speed of the boat in still water.