1. (6 pts.) Simplify by adding (or subtracting) like terms wherever possible:
\[ \sqrt{2} x - 3x + 2x + 3x - 4 \cdot 3x + 2 \cdot 3y - 6y \]

2. (7 pts.) Simplify completely: \( \left( 8^{\frac{2}{3}} - 27^{\frac{2}{3}} \right)^3 \)

3. (7 pts.) Simplify completely: \( \frac{2^{-1} + 3^{-1}}{2^{-1} - 5^{-1}} \)

4. (6 pts.) Solve: \( \frac{x + 2}{2} - \frac{1}{4} = 4(x - 3) + \frac{1}{2} \)

5. (7 pts.) Solve for \( s \):
\[ \frac{s}{sr - t} = 3 \]

6. (7 pts.) Find 3 consecutive even numbers such that 3 times the smallest added to 2 times
the largest is 14 less than 6 times the middle one.

7. (7 pts.) Simplify completely: \( \left( \frac{2r^{-2}s^0}{r^2s^4} \right)^{-3} (r^3s) \)

8. (6 pts.) Solve and graph the solution set: \( -\frac{1}{3} \leq -\frac{3x}{5} \)

9. (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) For which number(s), \( x \), does \( f(x) = 0 \)?

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(d) What is $f(4)$?

10. (6 pts.) Let $f$ be the function given by $f(x) = \frac{\sqrt{3x - 1}}{6}$. What is the domain of $f$?

11. (7 pts.) Graph the function $h(x) = |x + 2| - 2$. Label all intercepts.

12. (6 pts.) Let $g$ be the function given by $g(x) = \frac{3x}{4x^2 + 6}$. Find and simplify $g(1) - 2g(-1)$.

13. (7 pts.) Find the equation of the line through $(-1, -2)$ which is perpendicular to the line $2x - 3y = 6$.

14. (6 pts.) Find the equation of the line which is parallel to the $y$ axis and goes through the point $(3, -2)$.

15. (7 pts.) There are 56 students in a class. The number of students in each row is 2 more than three times the number of rows in the classroom. Find the number of rows in the classroom and the number of students in each row.

16. (7 pts.) Solve:
$$\begin{cases} 2x + 7y = 8 \\ 3x + 5y = 1 \end{cases}$$

17. (6 pts.) Factor completely: $32x^5 - 2xy^4$

18. (6 pts.) Solve: $(6x + 5)(x - 1) = -3$

19. (7 pts.) Simplify: $\frac{x^2(x - 2)}{x^2 - 4}$

20. (7 pts.) Solve: $\frac{x}{x + 4} - \frac{16}{x^2 + 4x} = \frac{2}{x}$
21. (7 pts.) Tickets for a concert were sold at $8 for adults and $5 for children. There were 100 tickets sold for a total of $710. Find the number of each type sold.

22. (6 pts.) Simplify completely: \[
\left( \frac{1}{8^{\frac{1}{3}}} \right)^{-\frac{4}{3}}
\]

23. (7 pts.) Simplify completely: \[
\sqrt{2x} \cdot \sqrt[4]{\frac{x^3 y^{-3}}{32y^5}}
\]

24. (7 pts.) Solve: \[\sqrt{x+3} + 3 = x\]

25. (7 pts.) A rectangle has sides \(\sqrt{5}\) inches and \(2\sqrt{3}\) inches. Find the length of the diagonal.

26. (7 pts.) Simplify and write the answer in the form \(a + bi\): \((3 - 2i)^2 - (4 + 5i)\)

27. (7 pts.) Solve, writing any non-real solutions in the form \(a + bi\): \[-x^2 - 13 = -6x\]

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

29. (7 pts.) Solve: \(x(x + 3)(x + 3) < 0\)

30. (6 pts.) Find: 
(a) \(\log_8(2)\)  
(b) \(\log_3\left(\frac{1}{9}\right)\)  
(c) \(\log_2(32)\)