1. (7 pts.) Simplify by adding (or subtracting) like terms wherever possible:
\[ \sqrt{2}a + 3a^2 + \frac{1}{2}a^2 - 5a + b^2 - \frac{3}{2}a^2 \]

2. (7 pts.) Simplify completely:
\[ \sqrt[3]{\frac{y^8 z^{-3}}{x^0 y^{-1}}} \cdot \sqrt[4]{\frac{x^4 y^3}{z}} \]

3. (7 pts.) Simplify completely:
\[ \left( \sqrt[4]{8} - \frac{\sqrt{2}}{} \right)^2 \]

4. (7 pts.) Simplify completely:
\[ \left[ \frac{9 - \frac{1}{2}}{9 - \frac{3}{2} + 9 - \frac{1}{2}} \right]^{-2} \]

5. (6 pts.) Let \( f(x) = 8 - |2 - x| \). Find all \( x \) such that \( f(x) = -1 \).

6. (6 pts.) Solve:
\[ -3 \left| \frac{2x - 1}{3} \right| - 2 \leq 5 \]

7. (7 pts.) The Pistons made 43 baskets during their last game, some 2-point baskets and some 3-point baskets. If they scored a total of 94 points from the field, how many of each type of basket did they make?

8. (7 pts.) Solve for \( P \):
\[ \frac{QR - P}{PQ} - 1 = \frac{1}{P} \]

9. (6 pts.) Let \( f \) be the function given by \( f(x) = \frac{12}{\sqrt{3x - 2}} \).

What is the domain of \( f \)?

10. (6 pts.) Let \( f \) be the function given by \( f(x) = \frac{\sqrt{x^2 + 5} + 3}{x} \).

Find and simplify \( f(2) - f(-2) \).
11. (7 pts.) Let \( f \) be the function given by \( f(x) = 3x^2 + 2x - 1 \).

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

12. (6 pts.) Find the equation of the line that is perpendicular to the line \( 2x - 3y = 5 \) and passes through the point \((2, -4)\).

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

14. (7 pts.) The width of a rectangle is 7 feet and the diagonal is 13 feet. Find the AREA of the rectangle.

15. (7 pts.) Solve, writing any non-real solutions in the form \( a + bi \): \( (x^2 + 5)(x^2 - x - 3) = 0 \)

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

17. (7 pts.) Simplify completely:
\[
\frac{x - 6}{x^2 - 4} - \frac{x - 1}{2 - x} - \frac{x + 1}{x + 2}
\]

18. (7 pts.) Solve:
\[
\sqrt{x + 2} + \sqrt{x - 1} = 3
\]

19. (7 pts.) Solve:
\[
2x^2 - 3x - 2 \leq 0
\]

20. (7 pts.) Solve:
\[
\frac{x + 1}{x - 4} \leq 2
\]

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) For what input(s), \( x \), does \( f(x) = 2 \)?
22. (7 pts.) Solve: \( x^2 - 6 = -x^3 \)

23. (6 pts.) Find: a) \( \log_3(81) \)  
    b) \( \log_\pi\left(\frac{1}{\pi^3}\right) \)  
    c) \( \log_{1000}(10) \)

24. (6 pts.) Using the approximate values \( \log_7(6) = 0.9 \) and \( \log_7(18) = 1.5 \) find: 
   a) \( \log_7(3) \)  
   b) \( \log_7(\sqrt{42}) \)  
   c) \( \log_7\left(\frac{1}{36}\right) \)

25. (7 pts.) Solve: \( \log_2(x + 11) + \log_2(x + 7) = 5 \)

26. (7 pts.) Identify and sketch the curve given by \( 16x^2 - 4y^2 = 64 \).

27. (7 pts.) Arrange the following numbers in order from smallest to largest:
   \( \sin(110^\circ), \cos(110^\circ), \log_3(\pi), \tan(\pi) \)

28. (6 pts.) Convert to radians:
   a) \( 5\pi^\circ \)
   b) \( -140^\circ \)

29. (6 pts.) For the right triangle shown here, find an exact value for:
   a) \( \sin(\angle A) \)
   b) \( \tan(\angle B) \)

30. (7 pts.) On a river with a current of 5 mph a boat can travel 210 miles downstream in the same amount of time it takes to travel 150 miles upstream. What is the boat’s speed in still water?