1. Perform the operations and simplify.

(a) \[ \frac{2}{x+3} - \frac{6}{3x+2} \]

(b) \[ \frac{(9x^4)^{3/2}}{(\sqrt{3}x)^4} \]

2. Completely simplify the expressions.

(a) \[ \frac{\sqrt{4x^2 + 16x}}{2} \]

(b) \[ \frac{8x^{1/4} - 2x^{-3/4}}{2x^{-3/4}} \]

(c) \[ \frac{3x^3(x^2 - 5)^{-1/2} - 3x(x^2 - 5)^{1/2}}{5(x^2 - 5)^{-1/2}} \]
3. Find all solutions of $2x^2 - 8x = -\frac{13}{2}$

4. Solve the inequality and write the solution set in interval notation $2x^4 - 2x^3 - 12x^2 < 0$. 
5. Find an equation of the line passing through the points, \((-1, 2), (2, -3)\).

6. Given the line shown in the figure at right.
   (a) Determine the slope of the line.
   (b) Find an equation of the line.
   (c) Determine the interval(s) for which \(f(x) \geq 1\).

7. Find the difference quotient and simplify your answer if \(f(x) = x^2 - 3x + 2\),

\[
\frac{f(x + h) - f(x)}{h}
\]
8. Show that \( f \) and \( g \) are inverse functions using the definition (algebraically).

\[
f(x) = 3 - x^3, \quad g(x) = \sqrt[3]{3 - x}
\]

9. Use the graphs of \( f \) and \( g \) to evaluate each of the functions below (recall \((f \circ g)(x) = f(g(x))\)).

(a) \((f + g)(1)\)

(b) \((g \circ f)(2)\)

(c) \((f \circ g)(0)\)

10. Determine whether the function \( g(x) = x^6 - \frac{3}{2}x^4 + 3x^2 - 2x \) is even, odd or neither, please show your work using the definitions for odd and even functions.
11. Find the quadratic function that has the indicated vertex and whose graph passes through the given point.
   Vertex: \((-2, 0)\); Point: \((-4, 8)\).
   [Recall the standard form of a quadratic is \(f(x) = a(x - h)^2 + k\).]

12. Find the \(x\)-intercept(s) of the function \(f(x) = x^2 + 5\).

13. Find all the real zeros of the function.
   (a) \(s(t) = 2(t - 1)(t + 5)^3 - 4(t - 1)^2(t + 5)^3\)

   (b) \(g(x) = \frac{2x - 7}{6x^2 - 11x + 3}\)
14. Write the quotient in standard form \((a + bi)\),

\[
\frac{3 - i}{2 + i}
\]

15. Use the quadratic formula to solve \(x^2 - 4x + 5 = 0\).

16. Write the polynomial as a product of linear factors \(f(x) = x^4 + 3x^2 - 4\). [i.e. \(f(x) = a_n(x - c_1)(x - c_2)...(x - c_n)\)]
17. Write the partial fraction decomposition of the expression \( \frac{8x + 4}{x^2 + 2x - 3} \), summarize your work on the line below.

\[
\frac{8x + 4}{x^2 + 2x - 3} =
\]

18. Find the exact value of the logarithm.

(a) \( \log_{10} 100 \)

(b) \( \ln \frac{1}{\sqrt{x}} \)

19. Use the properties of logarithms to condense the expression to the logarithm of a single quantity.

(a) \( \frac{1}{3} \ln x - \frac{1}{3} \ln y \)

(b) \( 2[3 \ln x - \ln (x + 1) - \ln (x - 1)] \)