1. Simplify the following expression, assuming the variables are positive.
\[ \left( \frac{y^2}{x^3y^{-4}} \right)^2 \]

2. Perform the indicated operation and simplify the result.
\[ (2x + 3)(x + 4)(x - 4) \]

3. Combine the following rational expressions and simplify.
\[ \frac{x}{x^2 - x - 2} - \frac{x + 3}{x^2 - 1} \]

4. Doug left a $3.50 tip for his server at a restaurant. If the tip was 18% of his meal price, how much did Doug pay for his meal?

5. Rationalize the denominator of the following.
\[ \frac{3}{\sqrt{5} - 1} \]

6. Perform the indicated operation and express the result in the form a + bi.
\[ (1 - 2i)(3 + 4i) \]

7. Find all real solutions of the following.
\[ \frac{5}{x + 7} = \frac{3}{x - 1} \]

8. Solve for all real and/or complex solutions.
\[ x^2 + x + 3 = 0 \]

9. Solve the following equation.
\[ 2x^3 + 3x^2 - 5x = 0 \]

10. Solve the following inequality.
\[ \frac{2}{3} - x \geq 1 \]
11. Solve the following inequality.

\[ |x - 4| + 2 > 5 \]

12. Lucy has $7500 to invest. She can invest part of it in bonds which pay 3% simple interest and part in a stock that pays 5% simple interest. How much should she invest at 3% to make $345 in interest each year?

13. Find the distance between the points P(-1,3) and Q(4, -2).

14. Sketch the graph of the equation \( y = \frac{1}{3}x - 1 \).

15. Find the equation in slope-intercept form of the line that passes through the point (1,3) and is parallel to the line with equation \( x + y = 2 \).

16. The cost of gasoline varies directly with the number of gallons of gasoline purchased. If you can purchase 5.94 gallons of gasoline for $20, how much will it cost to purchase 20 gallons of gasoline?

17. Find the domain of the following function.

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

18. The cost \( C \), in dollars, of renting a car for a day is given by the function

\[ C(x) = 0.35x + 20 \]

where \( x \) is the number of miles driven. If the cost of renting the car is $83.35, how many miles was the car driven?

19. Given the graph of the function \( f \), find \( f(4) \):
20. Find the vertex of the parabola that is the graph of the equation
\[ y = x^2 - 6x + 5 \]

21. Solve the following inequality.
\[ \frac{x - 3}{x + 1} > 0 \]

22. Find the x-intercepts of the graph of the function \( q(x) = x^2 + 9x + 14 \).

23. Given \( f(x) = \sqrt{x + 1} \) and \( g(x) = 2x + 1 \) find \( (f \circ g)(2) \).

24. A cell phone company offers a plan which charges customers monthly according to the following piecewise-defined function:
\[
C(x) = \begin{cases} 
30 & 0 \leq x \leq 300 \\
0.35x - 90 & x > 300 
\end{cases}
\]
where \( x \) is the number of minutes used for the month.
What would the monthly charge be for a customer using 365 minutes?

25. Find the inverse of the following function.
\[ f(x) = \frac{1}{x - 1} \]

26. Write the following expression as a sum and/or difference of logarithms. Express powers as factors.
\[ \ln \left( x^3 \sqrt{x + 2} \right) \]

27. Solve the following equation. Leave your answer in exact form or express it correct to three decimal places.
\[ 7e^{3x} = 2 \]

28. Solve the following equation for \( x \).
\[ \log_2(x + 5) + \log_2(x - 2) = 3 \]
29. Find the amount that results from investing $250 at 4% compounded quarterly for 5 years. Round your answer to the nearest cent.

(The formula for compounding is \( A = P \left( 1 + \frac{r}{n} \right)^{nt} \).)

30. Solve the system of equations.

\[
\begin{align*}
2x - y &= -6 \\
3x + 2y &= 5
\end{align*}
\]