1. Simplify the following expression, assuming all variables are positive. Express the answer so that all exponents are positive.
\[
\left( \frac{8x^5y^{-3}}{16x^{-3}y^2} \right)^{-3}
\]

2. Factor completely, or state that the polynomial is prime.
9x^2 - 9x + 2

3. Rationalize the denominator. Show your work or explain how you arrived at the answer.
\[
\frac{7}{\sqrt{5} - 2}
\]

4. Given the following expression,
\[
\frac{12}{x + 3} - \frac{2}{x + 1}
\]
   a. Find all values that must be excluded from the domain of the expression.
   b. Perform the indicated operation. Express your answer in factored form. Show your work.

5. Use the graph to answer the following questions.
   a. Determine the y-intercept, if any.
   b. Find f(−2).

6. Solve. Show your work.
8x - (3x + 2) + 10 = 3x

7. Evaluate x^2 + 2x - 1 for x = 3 + 2i. Show your work.

8. Solve. Show your work.
|2x - 3| = 4

9. Solve the inequality.
-6 < 4 - x ≤ 3
   a. Use interval notation to express the solution set.
   b. Graph the solution set on the number line.
10. Use the graph of \( f(x) \) to answer the following questions.
   a. Determine the domain of the function. Write your answer in interval notation.
   b. Determine the range of the function. Write your answer in interval notation.
   c. Determine the interval(s) on which the function is decreasing. Write your answer in interval notation.

11. Sketch a graph of the function
   \[ f(x) = \begin{cases} 
   2 & \text{if } -3 \leq x < 1 \\
   -x + 2 & \text{if } x = 1 \\
   2x - 2 & \text{if } x > 1 
   \end{cases} \]

12. A company that manufactures bicycles has a fixed cost of $100,000. It costs an additional $100 to produce each bicycle.
   a. Find an equation for the function \( C(x) \), where \( C \) is the cost to produce \( x \) bicycles.
   b. Find \( C(350) \) and explain what this number means.

13. Calculate the average rate of change of \( f(x) = x^3 - 2 \) for \( x_1 = -2 \) and \( x_2 = 1 \).

14. Given that \((3, -2)\) is a point on the graph of \( f(x) \), find the corresponding point on the graph of \( g(x) = -f(x + 1) - 3 \).

15. Given \( f(x) = \frac{3x}{x+2} \) and \( g(x) = 3x^2 - 1 \), find \((f \circ g)(x)\).

16. Given \( f(x) = x^2 + 2x - 8 \),
   a. find the vertex of the corresponding parabola.
   b. Sketch a graph of the function.

17. Given \( f(x) = -2x^3 (x + 3)(x - 4)^2 \),
   a. find the degree of the polynomial.
   b. find the \( x \)-intercepts.

18. a. Solve \( x(3 - x)(x - 5) \leq 0 \). Write your answer in interval notation.
   b. Graph the solution set on a number line.
19. Use the graph of \( f(x) \) to graph its inverse function. Label 3 points on your graph.

20. a. Show that \( x - 3 \) is a factor of \( f(x) = x^3 - 4x^2 + x + 6 \).
   
   b. Find a complete factorization of \( f(x) = x^3 - 4x^2 + x + 6 \).

21. The water temperature of the Pacific Ocean varies inversely as the water’s depth. At a depth of 1000 m, the water temperature is 4.4° Celsius. What is the water temperature at a depth of 5000 m?

22. a. Change the expression to an equivalent expression involving an exponent.
   \[ \log 3 = k \]
   
   b. Change the expression to an equivalent expression involving an logarithm.
   \[ e^5 = z \]

23. The function \( f(x) = 1 + 1.5 \ln(x + 1) \) models the average number of free-throws in a row that a basketball player can make during practice as a function of time, where \( x \) is the number of consecutive days the basketball player has practiced for two hours. After 206 consecutive days of practice, what is the average number of free throws in a row the basketball player makes? Round to the nearest whole number.

24. Solve the system of equations.
   \[
   \begin{align*}
   2x + 5y &= -4 \\
   3x - y &= 11
   \end{align*}
   \]

25. Circle the graph or graphs that do NOT represents a function. Explain your answer.