There are 20 questions worth 5 points each. Show your work in a neat and organized fashion.

1. Use **long division** to divide \((6x^3 - 5x^2 - 3) \div (3x + 2)\).

2. Given \(f(x) = x^4 + 3x^3 - 7x^2 + 13x - 10\), use the Remainder Theorem to evaluate \(f(-5)\).

3. Based on your answer to Problem 2, is \((x + 5)\) a factor of \(f(x)\)? Explain your reasoning.

4. For the function \(f(x) = \frac{5x^2 - 1}{x^2 - x - 6}\), identify all of its asymptotes (vertical, horizontal, or slant).

5. Suppose that \(y\) varies jointly as \(w\) and \(x\) and inversely as the square of \(z\). Write a variation model using \(k\) as the constant of variation.
6. Use the definition of a one-to-one function to determine whether \( f(x) = x^3 + 8 \) is one-to-one.

7. Using function composition, determine whether the functions \( f(x) = 2x - 7 \) and \( g(x) = \frac{x+7}{2} \) are inverses of each other.

Use the graph at the right to answer questions 8 and 9.

8. (a) As \( x \to \infty \), \( f(x) \to \) \________.
(b) As \( x \to -\infty \), \( f(x) \to \) \________.

9. (a) As \( x \to 3^- \), \( f(x) \to \) \________.
(b) As \( x \to 3^+ \), \( f(x) \to \) \________.

10. Suppose that $5000 is invested with a 6\% interest rate, compounded monthly. Write an expression for the total amount in the account after 10 years. Do not simplify your expression.

11. Find the domain of \( g(x) = \log(3 - x) \) and write it in interval notation.
12. Factor $g(x) = x^3 - x^2 - 14x + 24$ completely, given that 2 is a zero.

13. Write a polynomial of degree 3 with zeros 2, -2, and 7. Leave this polynomial in factored form.

For Problems 14 and 15, solve the inequalities and write your answer in interval notation.

14. $a^2 > 5a + 6$

15. $\frac{5-x}{x+1} \geq 0$.

16. The graph of a function $y = f(x)$ is given below. Is the function one-to-one? Justify your answer.
17. The amount of a pain reliever that a physician prescribes for a child varies directly as the weight of the child. A physician prescribes 160 mg for a 40-lb child. Write a variation model and solve for the constant of variation \( k \).

18. Find the inverse function of \( f(x) = \sqrt[3]{x - 5} \).

19. Evaluate

   (a) \( \log_2 16 \)  
   (b) \( \ln(e^8) \)

20. Graph the function \( f(x) = 2^x \).