Graphing Cubic Functions Practice

In Exercises 1 and 2, describe the end behavior of the graph of the function.

1. \( g(x) = -3x^3 + 12x + 8x + 2 \)

2. \( h(x) = 5x^3 + 6x^2 - 5x + 1 \)

3. \( f(x) = -2x^3 + 5x^2 + 4x - 3 \)

In Exercises 4 and 5, graph the polynomial function.

4. \( k(x) = -x^3 + 2x^2 + 3 \)

5. \( h(x) = x^3 - 2x + 3 \)

In Exercises 5 and 6, describe the intervals for which (a) \( f \) is increasing or decreasing, (b) \( f(x) > 0 \), and (c) \( f(x) < 0 \).

6.

7.
In Exercises 8-10, evaluate the function for the given value of \(x\).

8. \(f(x) = -x^3 + 5x^2 + 9x + 4; \ x = -11\)

9. \(g(x) = 3x^3 + 6x^2 + 12x - 10; \ x = \frac{1}{3}\)

10. \(h(x) = 9x^3 - 8x^2 + 11x + 8; \ x = -\frac{1}{2}\)

In Exercises 11 and 12, sketch a graph of the polynomial function \(f\) having the given characteristics. Use the graph to describe the degree and leading coefficient of the function \(f\).

11. \(f\) is increasing on the interval \((-\infty, 1)\); \(f\) is decreasing on the interval \((1, \infty)\).
   
   \(f(x) > 0\) on the interval \((-1, 3)\); \(f(x) < 0\) on the intervals \((-\infty, -1)\) and \((3, \infty)\).

12. \(f\) is increasing on the intervals \((-\infty, -1.1)\) and \((2.4, \infty)\); \(f\) is decreasing on the interval \((-1.1, 2.4)\).
   
   \(f(x) > 0\) on the intervals \((-2, 0)\) and \((4, \infty)\); \(f(x) < 0\) on the intervals \((-\infty, -2)\) and \((0, 4)\).

In Exercises 13-14, graph the function.

13. \(f(x) = (x + 2)^2(x - 3)\)

14. \(h(x) = 2(x - 1)(x - 2)(x + 2)\)
15. \( g(x) = \frac{1}{2}(x - 4)(x + 3)(x - 6) \)

16. \( h(x) = \frac{1}{5}(x - 3)(x - 4)(x + 8) \)

17. Describe and correct the error in using factors to graph \( f(x) = (x - 1)^2(x + 3) \). 

In Exercises 18-21, graph the function. Identify the \( x \)-intercepts and the points where the local maximums and local minimums occur. Determine the intervals for which the function is increasing and decreasing.

18. \( f(x) = x^3 + 3x^2 - 4x - 12 \)

19. \( f(x) = x^3 + 7x^2 - x - 7 \)

x-int: \hspace{1cm} Inc: \hspace{1cm} x-int: \hspace{1cm} inc:

local max: \hspace{1cm} Dec: \hspace{1cm} local max: \hspace{1cm} dec:

Local min: \hspace{1cm} local min:
20. \( f(x) = x^3 - 5x^2 + x - 5 \) 

21. \( f(x) = 2x^3 - 3x^2 - 18x + 27 \)

22. \( h(x) = 4x^7 \)

23. \( g(x) = -2x^6 + x^2 \)

24. \( f(x) = x^4 + 3x^2 \)

25. \( f(x) = x^5 + 3x^3 - x \)

26. \( g(x) = x^2 + 5x + 1 \)

27. \( f(x) = -x^3 + 2x - 9 \)