Name _____ Date _____

4.1 Extra Practice

In Exercises 1–4, determine whether the function is a polynomial function. If so, write it in standard form and state its degree, type, and leading coefficient.

1. $h(x) = 6x^3 - 9x^{-3} + x^2 - 5x - 1$

2. $f(x) = 11x^2 - \sqrt{7} + 12x$

3. $g(x) = 2x^4 - \frac{1}{3}x^2 - \sqrt{14}x^3 + 2x - \frac{5}{3}$

4. $f(x) = 2x^3 + 9x^2 - 5x + \frac{4}{x} - 1$

In Exercises 5–7, evaluate the function for the given value of *x*.

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

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

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

In Exercises 8 and 9, describe the end behavior of the function.

8. $g(x) = -5x^4 + 7x^3 - 7x^6 + x^2 - 9x + 2$

9. $h(x) = -2x^3 + 5x^2 + 4x^5 - 3x^4 + 12x^2 - 4$

In Exercises 10–13, graph the polynomial function.

10. $q(x) = x^4 - x^3 - 5x^2$

11. $h(x) = 4 - 2x^2 - x^4$

12. $k(x) = x^5 - 2x^4 + x - 2$

13. $f(x) = x^6 - 3x^5 + 2x^3 + x + 1$

In Exercises 14 and 15, sketch a graph of the polynomial function *f* with the given characteristics. Use the graph to describe the degree and leading coefficient of the function *f*.

14. 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 $(3, \infty)$.

15. f is increasing when $x < -1.1$ and $x > 2.4$; f is decreasing when $-1.1 < x < 2.4$.

$f(x) > 0$ when $-2 < x < 0$ and $x > 4$; $f(x) < 0$ when $x < -2$ and $0 < x < 4$.

Answers:

4.1 Extra Practice

1. not a polynomial function

2. polynomial function; $f(x) = 11x^2 + 12x - \sqrt{7}$, degree is 2, quadratic, leading coefficient is 11

3. polynomial function; $g(x) = 2x^4 - \sqrt{14}x^3 - \frac{1}{3}x^2 + 2x - \frac{5}{3}$, degree is 4, quartic, leading coefficient is 2

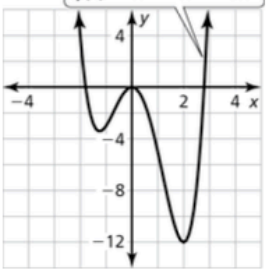
4. not a polynomial function

5. 1841 **6.** $-\frac{47}{9}$ **7.** $-\frac{5}{8}$

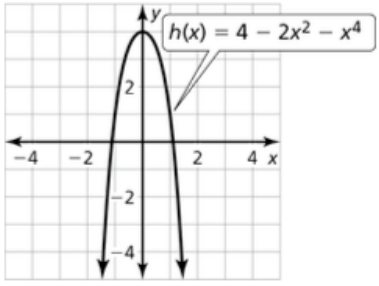
8. $g(x) \to -\infty$ as $x \to +\infty$ and $g(x) \to -\infty$ as $x \to -\infty$.

9. $h(x) \to +\infty$ as $x \to +\infty$ and $h(x) \to -\infty$ as $x \to -\infty$.

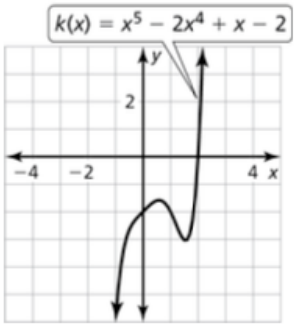
10.



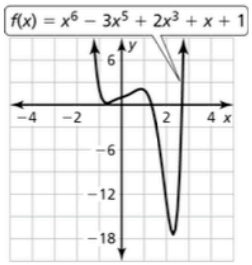
11.



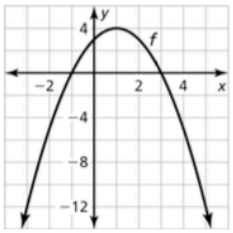
12.



13.

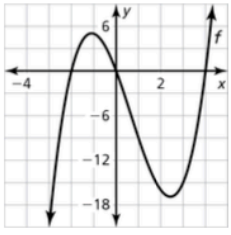


14.



The degree is even and the leading coefficient is negative.

15.



The degree is odd and the leading coefficient is positive.