1. polynomial function; $h(x) = -15x^7 - x^3 + 2x^2$; It has degree 7 and has a leading coefficient of -15.
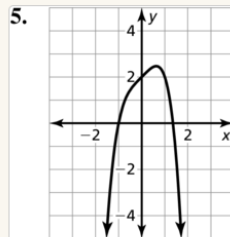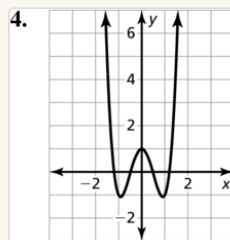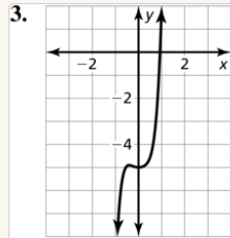
2. not a polynomial

3.

4.

5.

6. $4x^3 - 4x^2 - 4x - 8$

7. $3x^4 + 3x^3 - x^2 - 3x + 15$

8. $2x^2 + 11x + 1$

9. $2y^3 + 10y^2 + 5y - 21$

10. $8m^3 + 12m^2n + 6mn^2 + n^3$

11. $s^3 + 3s^2 - 10s - 24$

12. $m^4 + 16m^3 + 96m^2 + 256m + 256$

13. $243s^5 + 810s^4 + 1080s^3 + 720s^2 + 240s + 32$

14. $z^6 + 6z^5 + 15z^4 + 20z^3 + 15z^2 + 6z + 1$

15. $x - 1 + \dfrac{4x - 3}{x^2 + 2x + 1}$

16. $x^2 + 2x - 10 + \dfrac{7x + 43}{x^2 + x + 4}$

17. $x^3 - 4x^2 + 15x - 60 + \dfrac{233}{x + 4}$

18. $g(5) = 546$

19. $8(2x - 1)(4x^2 + 2x + 1)$

20. $2z(z^2 - 5)(z - 1)(z + 1)$

21. $(a - 2)(a + 2)(2a - 7)$

22.
$$
\begin{array}{r|rrrrr}
-2 & 1 & 2 & 0 & -27 & -54 \\
   &   & -2 & 0 & 0 & 54 \\
\hline
   & 1 & 0 & 0 & -27 & 0
\end{array}
$$
$f(x) = (x + 2)(x - 3)(x^2 + 3x + 9)$

23. $x = -4$, $x = -2$, and $x = 3$

24. $x = -4$, $x = -3$, and $x = 2$

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

26. $f(x) = x^4 - 5x^3 + x^2 + 25x - 30$

27. $f(x) = x^4 - 9x^3 + 11x^2 + 51x - 30$

28. The length is 6 inches, the width is 2 inches, and the height is 20 inches; When $\ell\,(\ell - 4)(3\ell + 2) = 240$, $\ell = 6$

29. $f(x) = x^3 - 5x^2 + 11x - 15$

30. $f(x) = x^4 - x^3 + 14x^2 - 16x - 32$
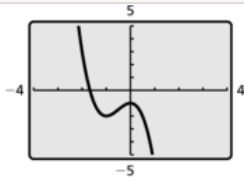
31. $f(x) = x^4 + 7x^3 + 6x^2 - 4x + 80$

32.

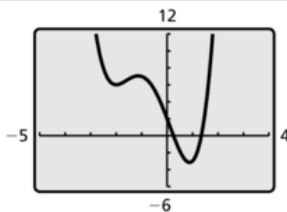| Positive real zeros	Negative real zeros	Imaginary zeros	Total zeros
2	0	2	4
0	0	4	4

33.

Positive real zeros	Negative real zeros	Imaginary zeros	Total zeros
1	3	0	4
1	1	2	4

38.

The x-intercept of the graph is $x \approx -1.68$. The function has a local maximum at $(0, -1)$ and a local minimum at $(-1, -2)$; The function is increasing when $-1 < x < 0$ and decreasing when $x < 1$ and $x > 0$.

39.

The x-intercepts of the graph are $x \approx 0.25$ and $x \approx 1.34$. The function has a local maximum at $(-1.13, 7.06)$ and local minimums at $(-2, 6)$ and $(0.88, -3.17)$; The function is increasing when $-2 < x < -1.13$ and $x > 0.88$ and is decreasing when $x < -2$ and $-1.13 < x < 0.88$.

40. odd

41. even

42. neither

43. $f(x) = \frac{3}{16}(x + 4)(x - 4)(x - 2)$

44. $3; f(x) = 2x^3 - 7x^2 - 6x$