

**(EXAMPLE 4)**

Graph each function and describe the general shape. **(EXAMPLE 5)**

**9**  $f(x) = x^3 - x$

**10**  $f(x) = x^4 - x^2 + 1$

**Practice and Apply**

Write each polynomial in standard form.

**11.**  $5x^3 + 4x + 2x^2 + 1$

**12.**  $4x^4 + x^2 + x^3 + x + 1$

**13.**  $2.7x^3 + 3.3x^8 + 4.1x^2$

**14.**  $9.1x^2 + 5.4x^5 + 3.3x^2 + 2.1$

**15.**  $\frac{x^7}{13} + \frac{x^9}{7} - \frac{2}{3}$

**16.**  $\frac{13}{15}x^4 + \frac{5}{7}x^3 + \frac{3}{5}x^5 + \frac{1}{2}$

Determine whether each expression is a polynomial. If so, classify the polynomial by degree and by number of terms.

**17.**  $7x^5 + 3x^3 - 2x + 4$

**18.**  $-4x^2 + 3x^3 - 5x^6 + 4$

**19.**  $3^x + 2^x - x - 7$

**20.**  $4^{2x} + 5^x - x + 1$

**21.**  $0.35x^4 + 2x^2 + 3.8x$

**22.**  $7.81x^4 + 8.9x^3 + 2.5x^2$

**23.**  $\frac{3}{x^2} + \frac{5}{x} + 6$

**24.**  $\frac{8}{x^3} - \frac{7}{x^2} + x$

**25.**  $\frac{5}{7}x^6 + \frac{2}{3}x^4 + 5$

**26.**  $\frac{x^5}{5} - \frac{x^3}{3}$

**27.**  $\sqrt{x} - 1$

**28.**  $7\sqrt{x} + 4$

Evaluate each polynomial expression for the indicated value of  $x$ .

**29.**  $x^3 + x^2 + 1$  for  $x = -3$

**30.**  $x^4 + 2x^3 + 2$  for  $x = -2$

**31.**  $-2x^3 - 3x + 2$  for  $x = 4$

**32.**  $-4x^3 + 1 + x$  for  $x = 3$

**33.**  $3x^3 + x^2 + 2x + 4$  for  $x = 5$

**34.**  $5x^3 + 2x^2 - 5x + 2$  for  $x = 6$

**35.**  $\frac{1}{4}x^4 + \frac{1}{8}x^3 + \frac{3}{8}x^2 + \frac{5}{8}x + \frac{7}{8}$  for  $x = 2$

**36.**  $\frac{3}{10}x^3 + \frac{7}{10}x^2 + \frac{1}{10}x + \frac{9}{10}$  for  $x = 10$

**37.**  $1 + x^2 - 3x^3$  for  $x = 2.5$

**38.**  $5x^3 + 4x + 2x^2 + 1$  for  $x = 3.8$

Write each sum or difference as a polynomial in standard form. Then classify the polynomial by degree and by number of terms.

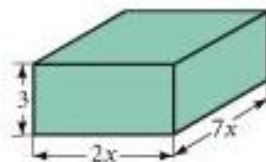
39.  $(x^3 + x^2 + x + 1) + (2x^3 + 3x^2 + x + 3)$   
 40.  $(x^5 + x^3 + x) + (x^4 + x^2 + 1)$   
 41.  $(1 - 5x + x^3) - (2x^4 + 5x^3 - 10x^2)$   
 42.  $(5x^3 + 3x^2 + 8x + 2) - (2x^2 + 4x + 7)$   
 43.  $(2x^2 - 5x + 3) + (4x^3 + 6x^2 - 2x + 5)$   
 44.  $(x^2 - 5x^3 + 7) + (6x + x^3 + 3x^2)$   
 45.  $(x^4 + 5x^2 + x) - (x^4 + 2x^3 + x - 4)$   
 46.  $(8x^2 + x^3 + 1 - 3x) + (2x^3 + 11x^4)$   
 47.  $\left(\frac{2}{3}x + \frac{2}{3}x^3 + 1\right) + \left(\frac{2}{3} + \frac{1}{3}x^2 + \frac{1}{3}x\right)$   
 48.  $\left(\frac{2}{7}x^2 + \frac{1}{7}x + \frac{3}{7}\right) - \left(\frac{4}{7}x^3 + \frac{6}{7}x^2 + \frac{2}{7}\right)$   
 49.  $(-3.2x^2 + 2.7x^3 + 7.8x) + (4.9x^3 + 2.5x^4)$   
 50.  $(4.1x^2 + 5.6x + 7.8) - (x^4 + 7.6x^2 + 9.8x)$

Graph each function. Describe its general shape.

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|--------------------------------------|---|
| 51. $f(x) = x^3 - 3x^2 - 3x + 9$     | 52. $b(x) = x^3 - 4x^2 - 2x + 8$            |
| 53. $k(x) = x^4 - x^3 - x^2$         | 54. $m(x) = x^4 - 10x^2 + 9$                |
| 55. $r(x) = -4x^3 + 4x^2 + 19x - 10$ | 56. $s(x) = -2x^3 + x^2 + 10x - 5$          |
| 57. $j(x) = -x^4 + 7x^2 - 6$         | 58. $k(x) = -x^4 + 2x^3 + 13x^2 - 14x - 24$ |

59. When  $4x^3 - 3ax + 5$  is subtracted from  $11x^3 + ax^2 - x + b$ , the result is  $cx^3 - 2x^2 + dx - 1$ . Find  $a$ ,  $b$ ,  $c$ , and  $d$ .
60. The expression  $ax^3 + 2x^2 + cx + 1$  is  $5x^3 - 3$  greater than  $3x^3 + bx^2 + d - 7x$ . Find  $a$ ,  $b$ ,  $c$ , and  $d$ .

61. **GEOMETRY** Find the total area of the faces of the rectangular prism at right.



62. **BUSINESS** Polynomials are used in business to