1. Use the Remainder Theorem and synthetic division to find the function value.

$g(x) = 2x^6 + 9x^4 - 9x^2 + 4, \quad g(0)$

a. 4
b. 1
c. –2
d. 6
e. 5

2. Use long division to divide.

$(x^4 + 7x^3 + 10x^2 - x - 2) \div (x + 2)$

a. $x^3 + 5x^2 + 1$
b. $x^3 - 5x^2 - 1$
c. $x^3 + 5x^2 - 1$
d. $x^2 + 5x - 1$
e. $x^3 - 5x^2 + 1$

3. Use long division to divide.

$(4x + 2) \div (2x + 1)$

a. 4
b. 2
c. –2
d. 1
e. 3

4. Find the value of k such that x - 6 is a factor of $x^3 - kx^2 + 2kx - 24$.

a. $k = 6$
b. $k = 10$
c. $k = 8$
d. $k = 7$
e. $k = 9$

6. Determine whether the statement is true or false. Justify your answer.

If $(9x + 2)$ is a factor of some polynomial function f, then $\frac{2}{9}$ is a zero of f.

a. True. $\frac{2}{9}$ is a zero of f.

b. False. $-\frac{2}{9}$ is a zero of f.

7. Determine whether the statement is true or false. Justify your answer.

The rational expression

$$\frac{x^4+2x^2-12x+12}{x^3-5x-15}$$

is improper.

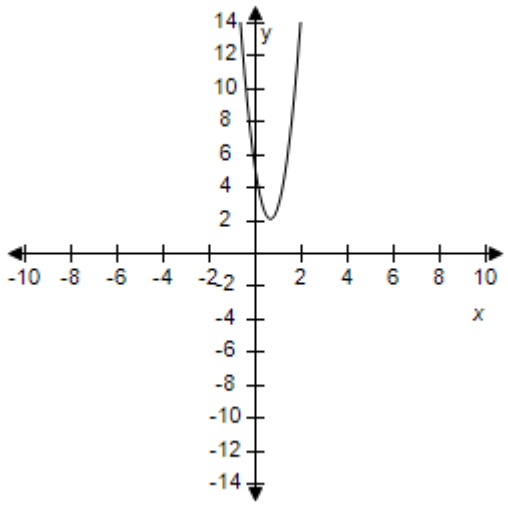
a. True. The degree of the numerator is greater than the degree of the denominator.

b. False. The degree of the denominator is smaller than the degree of the numerator.

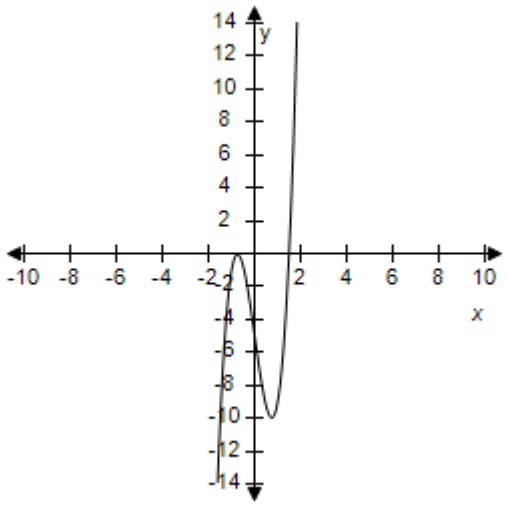
8. Select the correct graph of the following function.

$f(x)=6x^3+x^2-9x+5$

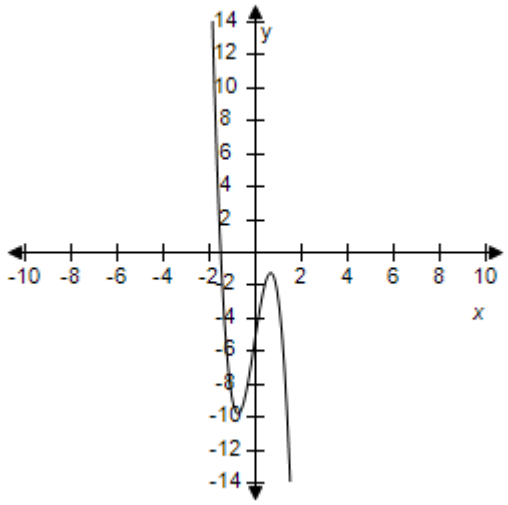
a.



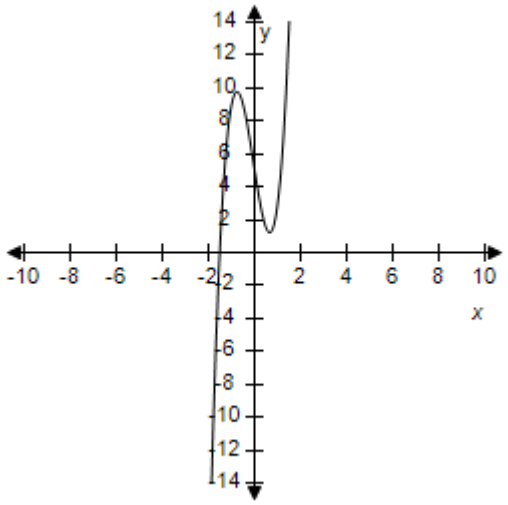
b.



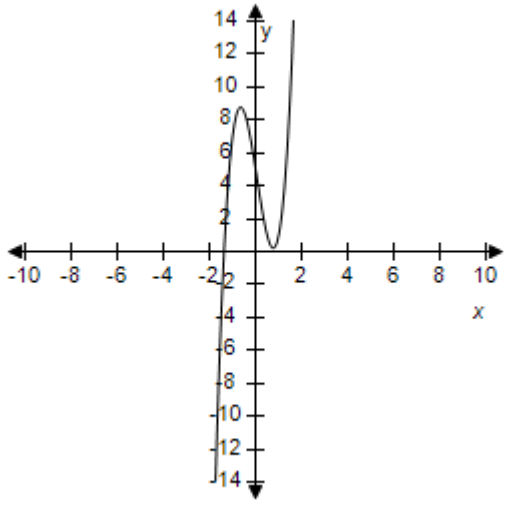
c.



d.



e.

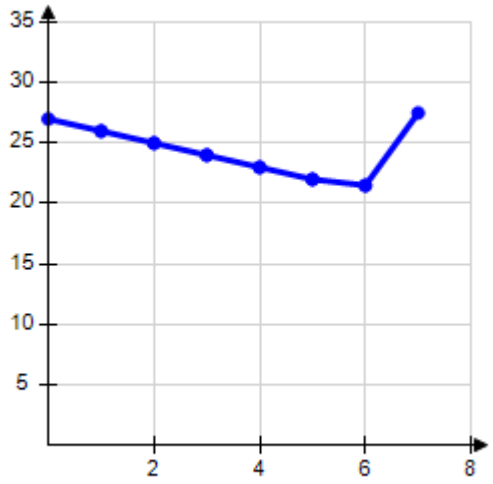


9. The amounts A (in billions of dollars) donated to support higher education in the United States from 2000 through 2007 are shown in the table, where t represents the year, with $t = 0$ corresponding to 2000.

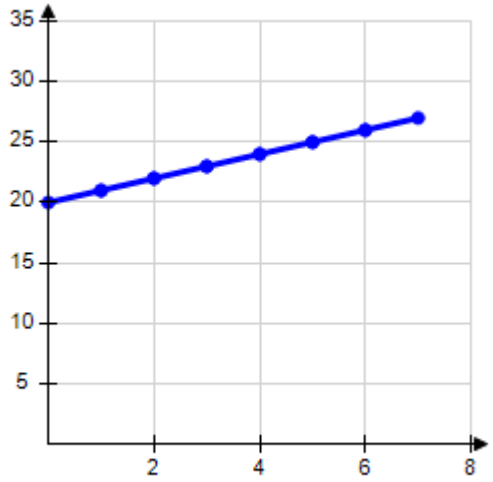
Year, t	Amount, A
0	23.3
1	24.3
2	24
3	24
4	24.5
5	25.7
6	28.1
7	29.9

Use a graphing utility to select a correct scatter plot of the above data.

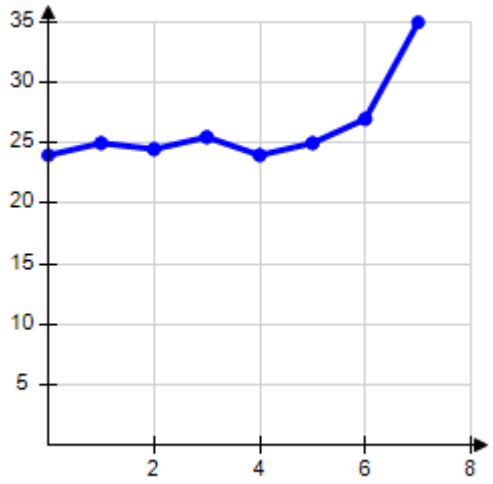
a.



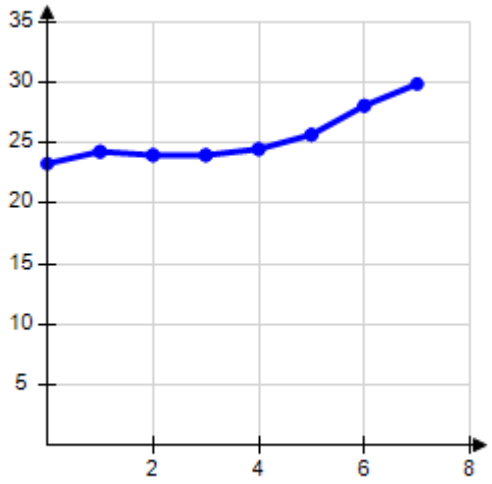
b.



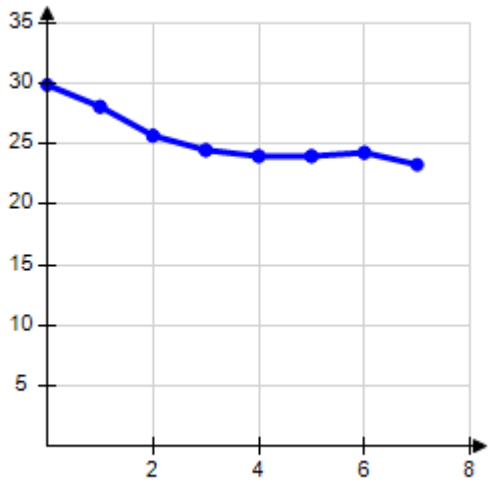
c.



d.



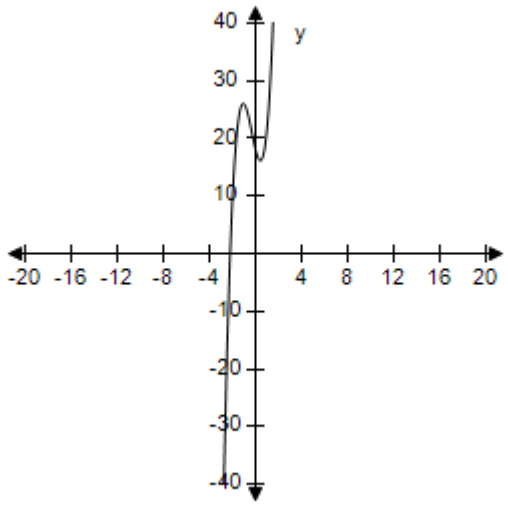
e.



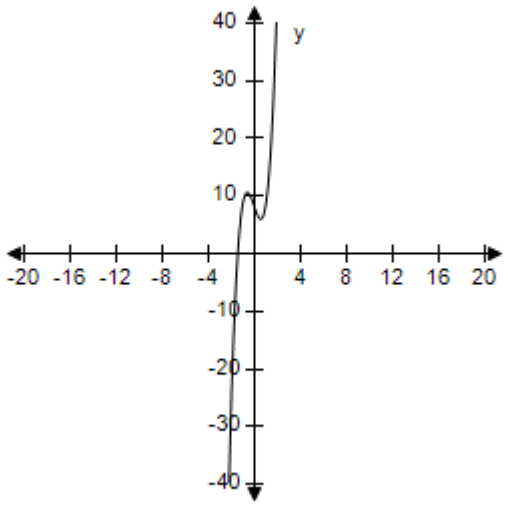
10. Select the correct graph of the following function.

$f(x) = 6x^3 + 6x^2 - 8x + 18$

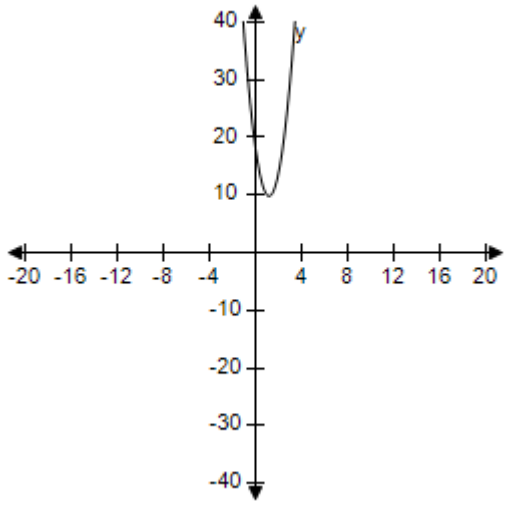
a.



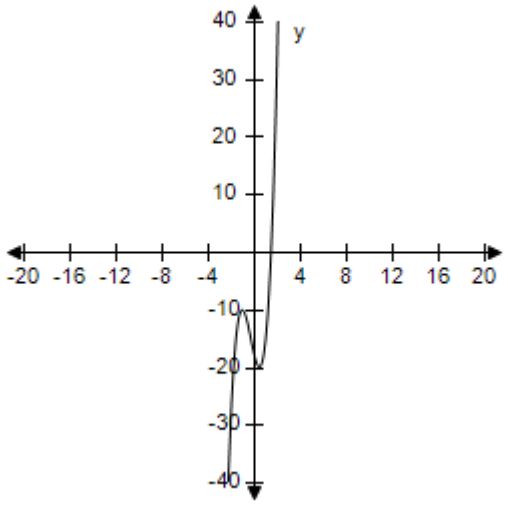
b.



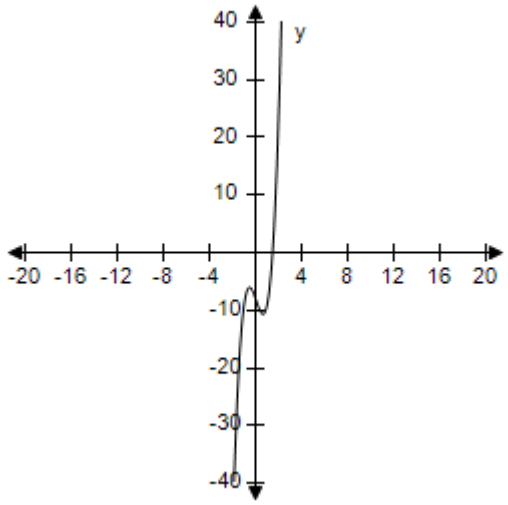
c.



d.



e.



13. Use long division to divide.

$(x^3+4x^2+x+4)\div(x+4)$

a. x^2+1

b. $x^2+8x+33-\dfrac{129}{x+4}$

c. x^2-4

d. $x^2+8x+33+\dfrac{120}{x+4}$

e. $x^2+8x+33$

16. Use synthetic division to divide.

$(4x^3+11x^2-43x+10)\div(x+5)$

a. $4x^2-11x-5$

b. $4x^2-9x+2$

c. $4x^2-3x-10$

d. $4x^2+19x-4$

e. $4x^2+6x-8$

17. Use synthetic division to divide.

$(12 + 5x^3 - 11x - 18x^2) \div (x - 4)$

a. $5x^2 + 2x - 3$

b. $5x^2 - 7x + 12$

c. $5x^2 + 2x + 5$

d. $5x^2 - 23x - 15$

e. $5x^2 + x - 4$

19. Use synthetic division to divide.

$$\frac{-4x^3 + 23x^2 - 31x + 12}{4x - 3}$$

a. $4x^2 + 12x + 16$

b. $x^2 + 4x - 4$

c. $-16x^2 + 12x + 16$

d. $-4x^2 - 12x + 16$

e. $-x^2 + 5x - 4$

21. If $f(x) = -4x^2 + 6x - 7$, use synthetic division to evaluate $f(2)$.

a. $f(2) = -11$

b. $f(2) = 21$

c. $f(2) = -35$

d. $f(2) = -3$

e. $f(2) = -1$

22. If $x = -4$ is a root of $x^3 + 5x^2 - 16x - 80 = 0$, use synthetic division to factor the polynomial completely and list all real solutions of the equation.

a. $(x + 5)(x - 5)(x - 4)$; $x = -5, 5, 4$

b. $(x + 5)^2(x + 4)$; $x = -5, -4$

c. $(x + 5)(x + 4)^2$; $x = -5, -4$

d. $(x - 5)(x + 4)(x - 4)$; $x = 5, -4, 4$

e. $(x + 5)(x + 4)(x - 4)$; $x = -5, -4, 4$

28. Simplify the rational expression, $\frac{4x^3+x^2-51x+36}{4x-3}$, by using long division or synthetic division.

a. $x^2+7x+16$

b. $x^2-7x-12$

c. $x^2-6x+12$

d. x^2+8x+9

e. x^2+x-12

29. Simplify the rational expression, $\frac{x^4+3x^3-25x^2-39x+180}{x^2-6x+9}$, by using long division or synthetic division.

a. $x^2+9x+20$

b. x^2+x+25

c. $-x^2+8x+25$

d. x^2+x-12

e. $-x^2-x+20$

30. Use long division to divide.

$(2x^2+12x+16)\div(x+4)$

a. $2x-4,\ x\neq -4$

b. $2x+4,\ x\neq -4$

c. $2x^2-4,\ x\neq -4$

d. $2x^2+4,\ x\neq -4$

e. $2x^2+4x,\ x\neq -4$

37. Write the function in the form $f(x) = (x - k)q(x) + r$ for the given value of k and demonstrate that $f(k) = r$.

$f(x) = x^3 - 5x^2 - 27x + 28, \quad k = 8$

a. $(x-8)(x^2-3x-3)+4$

b. $(x+8)(x^2+3x-3)+4$

c. $(x-8)(x^2+3x-3)+4$

d. $(x-8)(x^2+3x-3)-4$

e. $(x-8)(x^2-3x-3)-4$

41. Use synthetic division to divide.

$(5x^3+17x^2+3x-9) \div (x+3)$

a. $5x^2+2x+3, x \neq -3$

b. $5x^2+2x-3, x \neq -3$

c. $5x^2-2x-3, x \neq -3$

d. $2x^2-5x+3, x \neq -3$

e. $2x^2-5x-3, x \neq -3$

47. Use long division to divide.

$(4x^3-5x^2-1x+35) \div (4x+7)$

a. $x^2-3x-5, x \neq -\frac{7}{4}$

b. $4x^3-3x+5, x \neq -\frac{7}{4}$

c. $x^2+3x+5, x \neq -\frac{7}{4}$

d. $x^2-3x+5, x \neq -\frac{7}{4}$

e. $4x^2-3x-5, x \neq -\frac{7}{4}$

55. Use synthetic division to express $P(x) = 3x^3 - 10x^2 - 23x - 35$ in the form (*divisor*)(*quotient*) + *remainder* for the divisor $x - 5$.

a. $(x-3)(25x^2+5x+2)-25$

b. $(x-5)(3x^2+5x+2)-25$

c. $(x-5)(3x^2+2)-25$

d. $(x-5)(3x^2+x+2)$

e. none of these

59. Let $P(x) = 7x^3 + 4x^2 - 9x + 10$.

Use synthetic division to find the value P (–6).

a. –2,608
b. –1,303
c. –1,305
d. –1,304
e. none of these

60. If x = –2 is a root of $x^3 + 5x^2 - 4x - 20 = 0$, use synthetic division to factor the polynomial completely and list all real solutions of the equation.

a. $(x-5)(x+2)(x-2)$; $x = 5,-2,2$
b. $(x+5)(x+2)(x-2)$; $x = -5,-2,2$
c. $(x+5)(x+2)^2$; $x = -5,-2$
d. $(x+5)^2(x+2)$; $x = -5,-2$
e. $(x+5)(x-5)(x-2)$; $x = -5,5,2$

64. Find all the rational zeros of the function $f(x) = x^5 - 5x^4 + 11x^3 - 23x^2 + 28x - 12$.

a. $x = -2, 2, 1, 3$
b. $x = 3, 1$
c. $x = -2, -1, -3$
d. $x = -1, -2$
e. $x = -2, 2, -1, 1, -3$

68. Use Descartes' rule of signs to find the number of possible positive, negative, and nonreal roots for the following equation.

$4x^7 + 9x^2 + 5x + 10 = 0$

a. 0 positive; 1 negative; 6 nonreal
b. 2 positive; 1 or 3 negative; 4 or 0 nonreal
c. 0 positive; 0 negative; 7 nonreal
d. 0 positive; 0 or 2 negative; 5 or 7 nonreal
e. none of these

71. Find all the real zeros of $f(x) = 4x^3 - 20x^2 + 17x - 4$.

a. $x = \frac{1}{2}, 4$
b. $x = -\frac{1}{2}, -\frac{1}{4}$
c. $x = \frac{1}{4}, -2$
d. $x = \frac{1}{2}, -\frac{1}{4}$
e. $x = \frac{1}{2}, -4$

73. Find all rational roots of the equation.

$x^3 + 8x^2 - x - 8 = 0$

a. $x = -2$
b. $x = -1$
c. $x = 8$
d. $x = 1$
e. $x = 2$
f. $x = -8$

75. The number $(1 + i)$ is a root of the equation.

$x^3 - 10x^2 + 18x - 16 = 0$

Find the other roots of the equation.

a. $x = 1 - i$
b. $x = 1 + i$
c. $x = 5$
d. $x = 8$

76. Find all rational roots of the equation.

$7x^3 - 2x^2 + 7x - 2 = 0$

a. $x = -i$
b. $x = -\frac{2}{7}$
c. $x = i$
d. $x = \frac{2}{7}$
e. $x = -\frac{2}{5}$
f. $x = \frac{2}{5}$

80. Let $P(x) = 2x^3 + 9x^2 - 7x + 3$.

Use synthetic division to find the value $P(-7)$.

81. Use long division to divide.
$(x^3 - 5x - 3) \div (x - 2)$

82. Use synthetic division to perform the division.

$$\frac{3x^3 + 4x^2 + 18x - 25}{x - 1}$$

83. Use synthetic division to divide.

$$\frac{4x^3 + 31x^2 + 52x - 15}{x - \frac{1}{4}}$$