EXERCISES

Divide: a) by common division. b) by synthetic division if possible.

1. $\frac{x^2-5x+6}{x+2}$
2. $\frac{x^2+5x-6}{x-2}$
3. $\frac{x^2+3x-4}{x+2}$
4. $\frac{x^2-3x+4}{x-2}$
5. $\frac{4a^2+4a-12}{2a-1}$
6. $\frac{6a^2-5a+10}{3a+2}$
7. $\frac{x^3-5x^2+4x-2}{x-2}$
8. $\frac{x^3-5x^2+4x-2}{x+2}$
9. $\frac{2x^3-2x+1}{2x+4}$
10. $\frac{2x^3-x^2-5}{2x-5}$
11. $\frac{-4x^3+2x^2-x+1}{x+2}$
12. $\frac{2x^4-3x^3+x^2-x+5}{x-5}$
13. $\frac{2x^4+3x^3-x^2+x-5}{x+5}$
14. $\frac{x^4+x^2+2}{x-2}$
15. $\frac{x^4-x^2+2}{x+2}$
16. $\frac{x^5-4x^3+x}{x+3}$
17. $\frac{x^5+4x^3-x}{x-3}$
18. $\frac{2n^4-n^3-2n+5}{n^2+2n+1}$
19. $\frac{2x^4-3x^2+7x-8}{x^2+x-3}$
20. $\frac{x^3+4ax^2+4a^2x+a^3}{2a+x}$
21. $\frac{4a^4-9-3a-2a^3}{2a^2-a-3}$
22. $\frac{a^4-4}{a-4}$
23. $\frac{x^4+a^4}{x^2+a^2}$
24. $\frac{x^5+5}{x+1}$

Use synthetic division to determine whether $x-c$ is a factor of the given polynomial.

25. $f(x)=x^2+4x+4;\ x+2$
26. $f(x)=x^2+4x+4;\ x-2$
27. $f(x)=x^2-8x+16;\ x+4$
28. $f(x)=x^2-8x+16;\ x-4$
29. $f(a)=a^2-9;\ a-3$
30. $f(a)=a^2-9;\ a+3$
31. $f(x)=x^3-8;\ x-2$
32. $f(x)=x^3+8;\ x-2$
33. $f(x)=4x^2-9;\ x-\frac{3}{2}$
34. $f(x)=4x^2-9;\ x+\frac{3}{2}$
35. $f(x)=x^3-x^2-6x;\ x-3$
36. $f(x)=x^3-x^2-6x;\ x+3$
37. $f(x)=4x^3+10x^2-14x;\ x-1$
38. $f(x)=4x^3+10x^2-14x;\ x+1$
39. $f(p)=p^5-13p^3+36p;\ p+3$
40. $f(t)=t^5+t^3+t+1;\ t+1$
41. $p(x)=x^3-2x^2-3x+6;\ x-\sqrt{3}$
42. $p(x)=2x^3+x^2-10x-5;\ x+\sqrt{5}$
43. $p(x)=x^4-x^3-5x^2-x-6;\ x-i$
44. $p(a)=a^3+a^2+4a-2;\ a+2i$

-----Continued-----

If one root of the equation is given. Solve the equation for all roots.

45. $x^3+6x^2+11x+6=0;\ x=-2$

46. $2x^3+9x^2+7x-6=0;\ x=-3$

47. $2x^3+x^2-10x-5=0;\ x=\sqrt{5}$

48. $x^3-3x^2+3x-9=0;\ x=-\sqrt{3}\,i$

49. $x^3-4x^2+21x-34=0;\ x=2$

50. $x^3+x+10=0;\ x=-2$

51. $2x^3-x^2-7x+6=0;\ x=1$

52. $2a^3+a^2-8a+3=0;\ a=\frac{3}{2}$

Find the polynomial equation with the given roots.

53. $-1, -2, -3$

54. $-2, -3, \frac{1}{2}$

55. $-\frac{1}{2}, \pm\sqrt{5}$

56. $3, \pm\sqrt{3}\,i$

57. $2, 1\pm 4\,i$

58. $-2, 1\pm 2i$

59. $1, -2, \frac{3}{2}$

60. $\frac{3}{2}, -1\pm\sqrt{2}$

Use the Factor Theorem to determine whether $x-c$ is a factor of the given polynomial.

61. $f(x)=x^2+4x+4;\ x+2$

62. $f(x)=x^2+4x+4;\ x-2$

63. $f(x)=x^2-8x+16;\ x+4$

64. $f(x)=x^2-8x+16;\ x-4$

65. $f(a)=a^2-9;\ a-3$

66. $f(a)=a^2-9;\ a+3$

67. $f(x)=x^3-8;\ x-2$

68. $f(x)=x^3+8;\ x-2$

69. $f(x)=4x^2-9;\ x-\frac{3}{2}$

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

71. $f(x)=x^3-x^2-6x;\ x-3$

72. $f(x)=x^3-x^2-6x;\ x+3$

73. $f(x)=4x^3+10x^2-14x;\ x-1$

74. $f(x)=4x^3+10x-14x;\ x+1$

75. $f(p)=p^5-13p^3+36p;\ p+3$

76. $f(t)=t^5+t^3+t+1;\ t+1$

77. $p(x)=x^3-2x^2-3x+6;\ x-\sqrt{3}$

78. $p(x)=2x^3+x^2-10x-5;\ x+\sqrt{5}$

79. $p(x)=x^4-x^3-5x^2-x-6;\ x-i$

80. $p(a)=a^3+a^2+4a-2;\ a+2\,i$

81. Find k such that $f(x)=2x^3-x^2-kx+6$ has the factor $x-1$.

82. Find k such that $f(x)=2x^3+kx^2-7x+6$ has the factor $x+2$.

83. Find k such that $f(x)=2x^3-x^2-7x+k$ has the factor $x-\frac{3}{2}$.

84. Find k such that $f(x)=x^3+kx^2-3x-9$ has the factor $x-\sqrt{3}$.

85. If $f(x)=3x^{20}-5x^{15}+x^2-2$ is divided by $x+1$, find the remainder.

86. If $f(x)=3x^{20}-5x^{15}+x^2-2$ is divided by $x-1$, find the remainder.

87. Use synthetic division to solve the equation $2x^4-5x^3+5x-2=0$ given that two roots are -1, [illegible]

88. Is $\frac{1}{2}$ a root (zero) of the equation $2x^3+9x^2+7x-6=0$?

89. Is $-\sqrt{5}$ a root (zero) of the equation $2x^3+x^2-10x-5=0$?

90. When a polynomial $f(x)$ is divided by $x-2$, the quotient is $3x^2+x+3$ and the remainder is 4. Find $f(x)$.