

Chap 4 Sec 3 – 4

1. Give three different polynomials of degree 8, each with zeroes at $x = -3$, 5.7 and π , and nowhere else.
2. Give three different polynomials of degree 6, each with zeroes at $x = 2$, -3.7 and 5 , and nowhere else.
3. Give three different polynomials of degree 9, each with zeroes at $x = 3$, 2.7 and $\sqrt{7}$, and nowhere else.
4. Give three different polynomials of degree 15 with zeroes at $x = 0$, -7 and $-\pi$, and nowhere else.
5. Factor $p(x) = 2x^2 + 7.6x - 13.26$.
6. Factor $p(x) = x^2 - 0.6x - 3.91$
7. Factor $p(x) = 2x^2 - 1.2x - 7.82$
8. Factor $p(x) = 3x^2 - 0.9x - 26.04$
9. Factor $p(x) = -2x^2 + 1.2x + 7.82$
10. Divide $\frac{3x^4 - 11x^2 + x + 3}{x + 2}$ + $\frac{\quad}{x + 2}$
11. Divide $\frac{3x^4 - 7x^2 + x + 3}{x - 1}$ + $\frac{\quad}{x - 1}$
12. Divide $\frac{2x^4 - 3x^2 + 5x + 3}{x + 2}$ + $\frac{\quad}{x + 2}$
13. Divide $\frac{3x^4 - 6x^2 + x + 3}{x - 2}$ + $\frac{\quad}{x - 2}$
14. Factor $p(x) = x^4 - 3x^3 + 2x^2 + x - 2$ given that $p(2) = 0$
15. Factor $p(x) = 2x^4 - 5.2x^3 + 2.1x^2 + 3x - 6.3$ given that $p(2.1) = 0$.
16. Factor $p(x) = x^3 - 0.7x^2 - 0.4x - 13.5$ given that $p(2.7) = 0$.
17. Factor $p(x) = x^4 + 1.9x^3 - x^2 + 3.1x + 9.5$ given that $p(-1.9) = 0$.
18. Factor $p(x) = 2x^4 + 3.8x^3 - x^2 + 3.1x + 9.5$ given that $p(-1.9) = 0$.
19. Factor $p(x) = 2x^4 - 4.8x^3 + 1.9x^2 + 5x - 9.5$ given that $p(1.9) = 0$.
20. Give three different polynomials of degree 7 with zeroes at $x = 2$, -3.7 , $\sqrt{2}$, and nowhere else.

$$p_1(x) = \underline{\hspace{10em}}$$

$$p_2(x) = \underline{\hspace{10em}}$$

$$p_3(x) = \underline{\hspace{10em}}$$

21. Factor $p(x) = 2x^2 - 1.2x - 7.82$.

$$p(x) = \underline{\hspace{10cm}}.$$

22. Divide $\frac{3x^4 - 11x^2 + x + 3}{x + 2} = \boxed{\hspace{4cm}} + \frac{\hspace{1cm}}{x + 2}$

23. Factor $p(x) = 2x^3 - 4.2x^2 - 1.7x + 3.57$ given that $p(2.1) = 0$.

$$p(x) = \underline{\hspace{10cm}}.$$

24. Give three different polynomials of degree 9, each having zeroes at $x = 3.6, 2, -7$, and nowhere else.

$$p_1(x) = \underline{\hspace{10cm}}.$$

$$p_2(x) = \underline{\hspace{10cm}}.$$

$$p_3(x) = \underline{\hspace{10cm}}.$$

25. Factor $p(x) = 3x^2 + 0.6x - 14.49$.

$$p(x) = \underline{\hspace{10cm}}.$$

26. Factor $p(x) = 2x^3 - 1.6x^2 + 0.4x - 2.21$ given that $p(1.3) = 0$.

$$p(x) = \underline{\hspace{10cm}}.$$

$$\begin{array}{r|rrrr} 1.3 & 2 & -1.6 & 0.4 & -2.21 \\ & & 2.6 & 1.3 & 2.21 \\ \hline & 2 & 1 & 1.7 & 0 \end{array}$$

27. Give three different polynomials of degree 9, each with zeroes at $x = 3, -2.7, -\sqrt{7}$, and nowhere else.

$$p_1(x) = \underline{\hspace{10cm}}.$$

$$p_2(x) = \underline{\hspace{10cm}}.$$

$$p_3(x) = \underline{\hspace{10cm}}.$$

28. Factor $p(x) = x^2 - 0.6x - 3.91$

$$p(x) = \underline{\hspace{10cm}}.$$

29. Factor algebraically $p(x) = 3x^2 - 0.9x - 26.04$

$$p(x) = \underline{\hspace{10cm}}.$$

30. Give two different polynomials of degree 8, each with zeroes at $x = -2, 3.7$ and -5 , and nowhere else.

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$$p_1(x) = \underline{\hspace{4cm}}$$

$$p_1(x) = \underline{\hspace{4cm}}$$

31. Factor $p(x) = 2x^4 - 19.2x^2 + 5.3x - 5.1$ given that $p(3) = 0$.
32. Give two different polynomials of degree 7, each with zeroes at $x = 2, -3.7$ and -5 , and nowhere else.
33. Factor $p(x) = 2x^4 - 19.2x^2 + 5.3x - 5.1$ given that $p(3) = 0$.
34. Give two different polynomials of degree 6, each with zeroes at $x = 2, -3.7$ and 5 , and nowhere else.
35. Factor $p(x) = 2x^4 - 5.2x^3 + 2.1x^2 + 3x - 6.3$ given that $p(2.1) = 0$.

In #36 - 40, factor and simplify:

36. $7x^2(x + 8)^5 + 9x^3(x + 8)^4$
37. $5x^{-3}(2x + 11)^7 + 7x^{-2}(2x + 11)^6$
38. $7x^{-4}(x + 8)^7 + 9x^{-5}(x + 8)^8$
39. $3x^{2/5}(3x + 8)^{-3} + 9x^{7/5}(3x + 8)^{-4}$
40. $7(x - 3)^{-2/5}(x + 4)^{7/4} + 2(x - 3)^{3/5}(x + 4)^{3/4}$

In #41 - 45, solve exactly

41. $9x^4(2x + 3)^7 + 9x^5(2x + 3)^6 = 0$
42. $5x^3(2x + 11)^7 + 7x^4(2x + 11)^6 = 0$
43. $7x^6(x + 8)^7 + 9x^5(x + 8)^8 = 0$
44. $3x^{12/5}(3x + 8)^3 + 9x^{7/5}(3x + 8)^4 = 0$
45. $7(x - 3)^{2/5}(x + 4)^{7/4} + 2(x - 3)^{7/5}(x + 4)^{3/4} = 0$
46. Factor $8x^3 + 27$ if possible. $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
47. Factor $125x^3 - 8$ if possible. $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
48. Factor $4x^2 + 9$ if possible.
49. Factor $2x - cb + 2b - cx$.
50. Factor $cx - b + cb - x$.
51. Factor $x^3 + 3x^2 - x - 3$.
52. Factor $x^3 + ax^2 - x - a$.
53. $2(x + 1)^3 - 3(x + 1)^4$
54. $3(x - 5)^5 + 7(x - 5)^4$
55. $(2x + 5)^5 + 2(2x + 5)^6$
56. $3(x + 5)^8 + 2(x + 5)^7$

57. $3(x - 2)^9 + 2(x - 2)^8$

58. $5(x + 2)^5 + 2(x + 2)^6$

In #59 – 73, solve exactly

59. $2(x + 1)^3 - 3(x + 1)^4 = 0$

60. $3(x - 5)^5 + 7(x - 5)^4 = 0$

61. $(2x + 5)^5 + 2(2x + 5)^6 = 0$

62. $3(x + 5)^{10} + 2(x + 5)^{11} = 0$

63. $3(x - 2)^6 + 2(x - 2)^5 = 0$

64. $2(x + 3)^9 + 5(x + 3)^8 = 0$

65. $3(x + 2)^{10}(x - 4)^8 + 2(x + 2)^{11}(x - 4)^7 = 0$

66. $3(x + 5)^{10}(x - 2)^8 + (x + 5)^9(x - 2)^9 = 0$

67. $5(x + 1)^{10}(x - 2)^8 + 2(x + 1)^{11}(x - 2)^7 = 0$

68. $4(x + 5)^5(x - 2)^8 + 2(x + 5)^4(x - 2)^9 = 0$

69. $7(x + 5)^{10}(x - 2)^8 + 2(x + 5)^{11}(x - 2)^7 = 0$

70. $2(x + 5)^{10}(x + 2)^8 - 3(x + 5)^{11}(x + 2)^7 = 0$

71. $3(x + 5)^{12}(x - 2)^8 + 2(x + 5)^{11}(x - 2)^9 = 0$

72. $3(x + 5)^{10}(x - 2)^8 - 2(x + 5)^{11}(x - 2)^7 = 0$

73. $3(x + 1)^6(x - 2)^6 - 2(x + 1)^5(x - 2)^7 = 0$

Answers:

1. $p_1(x) = (x + 3)(x - 5.7)(x - \pi)^6$

$p_2(x) = 2(x + 3)(x - 5.7)(x - \pi)^6$

$p_3(x) = -(x + 3)^2(x - 5.7)^3(x - \pi)(x^2 + 9)$

2. $p_1(x) = (x - 2)(x + 3.7)(x - 5)^4$

$p_2(x) = 2(x - 2)(x + 3.7)(x - 5)^4$

$p_3(x) = -(x - 2)(x + 3.7)(x - 5)^4$

3. $p_1(x) = (x - 3)(x - 2.7)^3(x - \sqrt{7})^5$

$p_2(x) = 2(x - 3)(x - 2.7)^3(x - \sqrt{7})^5$

$p_3(x) = -(x - 3)(x - 2.7)^3(x - \sqrt{7})^5$

4. $p_1(x) = x(x + 7)(x + \pi)^{13}$

$p_2(x) = 2x(x + 7)(x + \pi)^{13}$

$p_3(x) = -x(x + 7)(x + \pi)^{13}$

5. $p(x) = 2(x - 1.3)(x + 5.1)$

6. $p(x) = (x - 2.3)(x + 1.7)$

7. $p(x) = 2(x - 2.3)(x + 1.7)$

8. $p(x) = 3(x - 3.1)(x + 2.8)$

9. $p(x) = -2(x - 2.3)(x + 1.7)$

10. $\frac{3x^4 - 11x^2 + x + 3}{x + 2} = \boxed{3x^3 - 6x^2 + x - 1} + \frac{5}{x + 2}$

11. $\frac{3x^4 - 7x^2 + x + 3}{x - 1} = \boxed{3x^3 + 3x^2 - 4x - 3} + \frac{0}{x - 1}$

12. $\frac{2x^4 - 3x^2 + 5x + 3}{x + 2} = \boxed{2x^3 + 2x^2 - x + 4} + \frac{7}{x + 2}$

13. $\frac{3x^4 - 6x^2 + x + 3}{x - 2} = \boxed{4x^3 + 8x^2 + 10x + 21} + \frac{45}{x - 2}$

14. $p(x) = (x - 2)(x^3 - x^2 + 1)$

15. $p(x) = (x - 2.1)(2x^3 - x^2 + 3)$

16. $p(x) = (x - 2.7)(x^2 + 2x + 5)$

17. $p(x) = (x + 1.9)(x^3 - x + 5)$

18. $p(x) = (x + 1.9)(2x^3 - x + 5)$

19. $p(x) = (x - 1.9)(2x^3 - x^2 + 5)$

20.

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$$p_1(x) = (x - 2)(x + 3.7)(x - \sqrt{2})^5$$

$$p_2(x) = (x - 2)(x + 3.7)^5(x - \sqrt{2})$$

$$p_3(x) = 7(x - 2)(x + 3.7)^5(x - \sqrt{2})$$

$$21. \quad p(x) = 2(x - 2.3)(x + 1.7)$$

$$22. \quad \frac{3x^4 - 11x^2 + x + 3}{x + 2} = 3x^3 - 6x^2 + x - 1 + \frac{5}{x + 2}$$

$$23. \quad p(x) = (x - 2.1)(x^2 - 1.7)$$

24.

$$p_1(x) = (x - 3.6)(x - 2)(x + 7)^7$$

$$p_2(x) = 2(x - 3.6)^7(x - 2)(x + 7)$$

$$p_3(x) = -2(x - 3.6)^7(x - 2)(x + 7)$$

$$25. \quad p(x) = 3(x - 2.1)(x + 2.3)$$

$$26. \quad p(x) = (x - 1.3)(x^2 + x + 1.7)$$

27.

$$p_1(x) = (x - 3)(x + 2.7)(x + \sqrt{7})^7$$

$$p_2(x) = -8(x - 3)(x + 2.7)(x + \sqrt{7})^7$$

$$p_3(x) = (x - 3)^2(x + 2.7)(x + \sqrt{7})(x^2 + 1)^3$$

$$28. \quad p(x) = (x - 2.3)(x + 1.7) \text{ since } (0.6 \pm \sqrt{(0.6^2 - 4 \cdot 1 \cdot -3.91)}) / (2 \cdot 1) = 2.3, -1.7$$

$$29. \quad p(x) = 3(x - 3.1)(x + 2.8) \text{ since } (0.9 \pm \sqrt{(0.9^2 - 4 \cdot 3 \cdot -26.04)}) / (2 \cdot 3) = 3.1, -2.8$$

30.

$$p_1(x) = (x + 2)(x - 3.7)(x + 5)^6$$

$$p_1(x) = 5(x + 2)(x - 3.7)(x + 5)^6$$

$$31. \quad p(x) = (x - 3)(2x^3 + 6x^2 - 1.2x + 1.7)$$

32.

$$p_1(x) = (x - 2)(x + 3.7)(x + 5)^5$$

$$p_2(x) = -9(x - 2)^3(x + 3.7)(x + 5)(x^2 + 1)$$

$$33. \quad p(x) = (x - 3)(2x^3 + 6x^2 - 1.2x + 1.7)$$

34.

$$p_1(x) = (x - 2)(x + 3.7)(x - 5)^4$$

$$p_2(x) = 3(x - 2)(x + 3.7)(x - 5)^4$$

$$35. \quad p(x) = (x - 2.1)(2x^3 - x^2 + 3)$$

$$36. \quad x^2(x + 8)^4[16x + 56]$$

$$37. \quad x^{-3}(2x + 11)^6[17x + 55]$$

$$38. \quad x^{-5}(x + 8)^7[16x + 72]$$

$$39. \quad x^{2/5}(3x + 8)^{-4}[18x + 24]$$

$$40. \quad (x - 3)^{-2/5}(x + 4)^{3/4}[9x + 22]$$

$$41. \quad x^4(2x + 3)^6 [27x + 27] = 0 \quad x = 0, -2/3, -1$$

42. $x^3(2x + 11)^6[17x + 55] = 0$ $x = 0, -11/2, -55/17$
43. $x^5(x + 8)^7[16x + 72] = 0$ $x = 0, -8, -72/16$
44. $x^{7/5}(3x + 8)^3[30x + 72] = 0$ $x = 0, 3, -72/30$
45. $(x - 3)^{2/5}(x + 4)^{3/4}[9x + 22] = 0$ $x = 3, -4, -22/9$
46. $(2x + 3)(4x^2 - 6x + 9)$
47. $(5x - 2)(25x^2 + 10x + 4)$
48. not factorable with real numbers
49. $(x + b)(2 - c)$ grouping
50. $(x + b)(c - 1)$ grouping
51. $(x + 1)(x - 1)(x + 3)$ grouping
52. $(x + 1)(x - 1)(x + a)$ grouping
53. $(x + 1)^3[-3x - 1]$
54. $(x - 5)^4[3x - 8]$
55. $(2x + 5)^5[4x + 11]$
56. $(x + 5)^7[3x + 17]$
57. $(x - 2)^8[3x - 4]$
58. $(x + 2)^5[5 + 2(x + 2)] = (x + 2)^5[2x + 9]$
59. $x = -1, 1/3$
60. $x = 5, 8/3$
61. $x = -5/2, -11/4$
62. $x =$
63. $x = 2, 4/3$
64. $x = -11/5, (-3)$
65. $x = -2, 4, 8/5$
66. $x = -5, 2, -13/4$
67. $x = -1, 2, 8/7$
68. $x = -5, 2, -16/6$
69. $x = -5, 2, 4/9$
70. $x = -5, -2, -11$
71. $x = -5, 2, -11/5$
72. $x = -5, 2, 16$
73. $x = -1, 2, -7$