

CHAPTER 4 PRACTICE EXERCISES (*OPTIONAL)

4-01 ADD, SUBTRACT, AND MULTIPLY POLYNOMIALS

166 #1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 29, 33, 37, Mixed Review = 20

Mixed Review

1. (3-07) Solve $x^2 - 9 > 0$.
2. (3-07) Solve $x^2 - 6x + 9 \leq 0$.
3. (3-06) Solve by any method $2(x + 1)^2 + 5 = 11$.
4. (2-04) Graph $f(x) = x^3 - 2x - 3$.
5. (2-01) Graph $y = x^2 - 4x - 5$.

4-02 FACTOR AND SOLVE POLYNOMIAL EQUATIONS

180 #1, 5, 9, 13, 17, 21, 25, 29, 33, 49, 53, 188 #1, 3, 5, 7, Mixed Review = 20

Mixed Review

1. (4-01) Simplify $(2x - 1) + (x + 7)$.
2. (4-01) Simplify $(2x - 1)(x + 7)$.
3. (3-07) Solve $x^2 - 16 \leq 0$.
4. (3-06) Solve $x^2 - 5x + 4 = 0$.
5. (2-04) Graph and find the x-intercepts of $f(x) = 2x^3 - 5x^2 - 28x + 15$.

4-03 DIVIDE POLYNOMIALS

173 #1, 3, 5, 7, 9, 11, 13, 15, 21, 31, Mixed Review = 15

Mixed Review

1. (4-02) Factor $x^3 + 4x^2 + 4x$.
2. (4-02) Solve by factoring $x^3 + 3x^2 - 4x - 12$.
3. (4-01) Simplify $(x + 4)^2$.
4. (3-05) Solve $0 = x^2 - 3x + 1$.
5. (2-02) Write a quadratic function passing through (0, 2) with x-intercepts (-2, 0) and (-1, 0).

4-04 FIND RATIONAL ZEROS OF POLYNOMIAL FUNCTIONS

Use the remainder theorem to evaluate $f(x)$ at the given x value.

1. $f(x) = x^2 + 5x - 15$; $x = 3$
2. $f(x) = 2x^3 - 2x^2 + x + 1$; $x = -2$
3. $f(x) = 3x^3 - 4x^2 - 15$; $x = 3$
4. $f(x) = 2x^3 - x^2 - 3x - 10$; $x = 5$
5. $f(x) = 4x^3 - 2x + 9$; $x = -1$
8. $f(x) = 2x^3 - 3x^2 - 32x - 15$; $(x + 3)$
9. $f(x) = 2x^4 - x^3 - 9x^2 + 4x + 4$; $(x - 2)$; $(x - 1)$
10. $f(x) = 3x^4 + 2x^3 - 13x^2 - 8x + 4$; $(x + 1)$; $(x + 2)$
11. (4-03) Simplify $(2x^3 + 3x^2 - 4x + 5) \div (x^2 + x - 4)$
12. (4-03) Simplify $(3x^5 - 5x^3 - x + 4) \div (x - 2)$

Mixed Review

Show that the given binomial is a factor of $f(x)$, then find the zeros of $f(x)$.

6. $f(x) = x^3 + 6x^2 + 5x - 12$; $(x + 4)$
7. $f(x) = x^3 - 19x - 30$; $(x + 2)$
13. (4-02) $2x^2 + 9x + 4 = 0$
14. (4-02) $2x^3 + 2x^2 = 24x$
15. (4-02) $x^3 + 2x^2 - 16x - 32 = 0$

4-05 FIND ALL ZEROS OF POLYNOMIAL FUNCTIONS

List all the possible rational zeros.

1. $f(x) = x^4 + 10x^3 - 2x^2 + 3x - 18$
2. $f(x) = 2x^5 + 125x^3 - 1$
3. $f(x) = 3x^3 - 2x^2 + 6$
4. $f(x) = 4x^3 + 3x^2 + 5x + 24$
8. $f(x) = 3x^3 + 4x^2 - 5x - 2$
9. $f(x) = 2x^4 + 5x^3 - 5x^2 - 20x - 12$
10. $f(x) = x^4 - 16x^2 + 40x - 25$
11. $f(x) = 3x^4 + 4x^3 - 13x^2 + 66x - 40$

Mixed Review

Find all the zeros. (You may factor if they are easily factored.)

5. $f(x) = x^3 - 5x^2 - 2x + 24$
6. $f(x) = x^3 + 2x^2 - 13x + 10$
7. $f(x) = 2x^3 - x^2 - 2x + 1$
12. (4-04) Use the remainder theorem to evaluate $f(x) = -2x^4 - 3x^2 + 15$ for $x = -1$.
13. (4-03) Simplify $(4x^3 + 8x^2 + x - 1) \div (2x + 1)$.
14. (4-02) Factor $x^3 - 3x^2 - 4x + 12$.
15. (4-01) Simplify $(3x^2 + 1) + (x^2 - x + 15)$

4-REVIEW

Take this test as you would take a test in class. When you are finished, check your work against the answers.

4-01

Divide with synthetic division.

1. $(2x^2 + 3x - 4) \div (-2x^2 - 5x + 7)$
2. $(5x^2 - 4) \div (6x^2 + 4x + 17)$
3. $(2x^2 + 3x - 1) \div (x + 4)$
4. $(2x + 1)^2$
11. $(3x^3 + 7x^2 - 14x + 20) \div (x + 4)$
12. $(2x^4 + 3x^2 + 5x - 7) \div (x - 3)$

4-04

Use the remainder theorem to evaluate $f(x)$ at the given x value.

13. $3x^3 - 2x^2 + x + 18$; $x = 2$
14. $x^4 - 5x^2 + 3x - 20$; $x = -3$
15. $f(x) = x^3 - x^2 - 14x + 24$; $(x + 4)$
16. $f(x) = 6x^3 + x^2 - 5x - 2$; $(x - 1)$

4-02

Factor.

5. $x^3 + 6x^2 + 5x$
6. $4x^3 + 2x^2 + 16x + 8$

Solve by factoring.

7. $3x^3 + 15x^2 + 18x = 0$
8. $2x^3 + 3x^2 - 8x = 12$

4-03

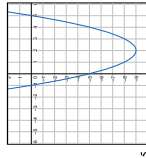
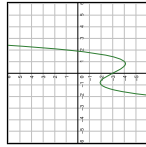
Divide with long division.

9. $(6x^3 + 13x^2 + 3x - 2) \div (2x^2 + 3x - 1)$
10. $(9x^3 + 6x^2 - 23x + 10) \div (3x - 2)$

ANSWERS

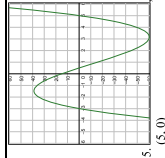
4-01

1. $x < -3$ or $x > 3$
2. $x = 3$
3. $-1 \pm \sqrt{3}$



4.
4-02

1. $3x + 6$
2. $2x^2 + 13x - 7$
3. $-4 \leq x \leq 4$
4. 1, 4



5. (5, 0)
x-ints: (-3, 0), (1/2, 0),

4-03

1. $x(x+2)^2$
2. -3, -2, 2
3. $x^2 + 8x + 16$
4. $\frac{3x\sqrt{x}}{2}$
5. $(x+2)(x+1)$

4-04

1. 9
2. -25
3. 200
4. 200
5. 7
6. -4, -3, 1
7. -3, -2, 5
8. -3, -1/2, 5
9. -2, -1, 1/2, 2
10. -2, -1, 1/2, 2
11. $2x^4 + 1 + \frac{3x+9}{x^2+4}$
12. $3x^4 + 6x^3 + 7x^2 + 14x + 27 + \frac{105}{x^2}$
13. -4, -1/2
14. -4, 0, 3
15. -4, -2, 4

4-05

1. $\pm 1, \pm 2, \pm 3, \pm 6, \pm 9, \pm 18$
2. $\pm \frac{1}{2}, \pm 1$
3. $\pm 1, \pm \frac{1}{3}, \pm 2, \pm \frac{2}{3}, \pm 3, \pm 6$
4. $\pm 1, \pm \frac{1}{2}, \pm \frac{1}{4}, \pm 2, \pm 3, \pm \frac{3}{2}, \pm \frac{3}{4}, \pm 4, \pm 6, \pm 8, \pm 12, \pm 24$
5. -2, 3, 4
6. -5, 1, 2
7. -1, 1/2, 1
8. -2, -1/3, 1
9. -2, -3/2, -1, 2
10. -5, 1, 2 $\pm i$
11. -4, 2/3, 1 $\pm 2i$
12. 10
13. $2x^2 + 3x - 1$
14. $(x-3)(x-2)(x+2)$
15. $4x^2 - x + 16$

4-REVIEW

1. $-2x+3$
2. $-x^2 - 4x - 21$
3. $2x^3 + 11x^2 + 11x - 4$
4. $4x^3 + 4x + 1$
5. $x(x+1)(x+5)$
6. $2(2x+1)(x^2+4)$
7. -3, -2, 0
8. 2, -3/2, 2
9. $3x^2 + 2$
10. $3x^2 + 4x - 5$
11. $3x^2 - 5x + 6 + \frac{-4}{x+4}$
12. $2x^3 + 6x^2 + 21x + 68 + \frac{105}{x-3}$
13. 36
14. 7
15. Yes
16. Yes
17. $\pm 1, \pm 2, \pm 4, \pm 8, \pm 16$
18. $\pm 1/2, \pm 1, \pm 2, \pm 4, \pm 8$
19. -2/3, -1/2, 2
20. -1, 2, $\pm 2i$