Math 135: Intermediate Algebra, Fall 2007
Homework 6, Nov 13 2007

Section 5.4: 1–11, 17–21, 29–41, 57–61 (page 445)

Factor

1. $\mathbf{2a^3 + 8a}$

   $= 2a(a^2) + 2a(4)$

   $= 2a(a^2 + 4)$

3. $\mathbf{32 - 40a + 24a^2}$

   $= 8(4) - 8(5a) + 8(3a^2)$

   $= 8(3a^2 - 5a + 4)$

5. $\mathbf{3x^4 + 7x^3 - 9x^2}$

   $= x^2(3x^2) + x^2(7x) - x^2(9)$

   $= x^2(3x^2 + 7x - 9)$

7. $\mathbf{12p^5 - 4p^4 - 24p}$

   $= 4p(3p^4) - 4p(p^3) - 4p(6)$

   $= 4p(3p^4 - p^3 - 6)$

9. $\mathbf{9x^2 - 28\ y^2}$

   can't be factored

11. $\mathbf{6x^2y^2 + 18xy^3 - 36y^4}$

    $= 6y^2(x^2) + 6y^2(3xy) - 6y^2(6y^2)$

    $= 6y^2(x^2 + 3xy + 6y^2)$

17. $\mathbf{3x(x - 5) + 2(x - 5)}$

    $= (3x + 2)(x - 5)$

19. $\mathbf{(2x - 3y)(3x) - (2x - 3y)(2y)}$

    $= (3x - 2y)(2x - 3y)$

21. $\mathbf{x(x + y)^2 - y(x + y)^2}$

    $= (x - y)(x + y)^2$

Factor by grouping

29. $\mathbf{x(y - 7) + 10(7 - y)}$

    $= x(y - 7) - 10(y - 7)$

    $= (x - 10)(y - 7)$

31. $\mathbf{4x(z - y) - (y - z)}$

    $= 4x(z - y) + (z - y)$

    $= (4x + 1)(z - y)$

33. $\mathbf{(2x - y) + 2x(y - 2x)}$

    $= (2x - y) - 2x(2x - y)$

    $= (1 - 2x)(2x - y)$

35. $\mathbf{ab + 5a + cb + 5c}$

    $= a(b + 5) + c(b + 5)$

    $= (a + c)(b + 5)$

37. $\mathbf{x^2 - 9x + 2x - 18}$

    $= x(x - 9) + 2(x - 9)$

    $= (x + 2)(x - 9)$

39. $\mathbf{9xy - 3y + 3x - 1}$

    $= 3y(3x - 1) + (3x - 1)$

    $= (3y + 1)(3x - 1)$

41. $\mathbf{10st - 6s - 25t + 15}$

    $= 2s(5t - 3) - 5(5t - 3)$

    $= (2s - 5)(5t - 3)$

57. The height above the ground (in feet) of a stone t sec after it is dropped from a bridge 720 ft. above the ground is given by the polynomial $720 - 16t^2$.
a. Factor the polynomial:

$720 - 16t^2 = 16(45) - 16(t^2) = 16(45 - t^2)$

b. Use the factored form in part (a) to find the height of the stone 5 sec after it is dropped:

Let h be the height of the stone in feet:

$h = 16\ (45 - t^2)$ ft

where t is the time after the stone is dropped in seconds. So

$h = 16\ (45 - 5^2)$ ft

$= 16\ (45 - 25)$

$= 16\ (20)$

$= 320$ ft.

59. The area (in sq m) of an Olympic-size swimming pool is given by the expression $l^2 - 25l$, where l is the length of the pool.

a. Factor this expression

$l^2 - 25l = l(l - 25)$

b. The width of an Olympic-size swimming pool is 25 m. What is the length?

Area A = length × width

let w be the width (and l is the length)

$A = lw = l(l - 25)$ m^2

$w = l - 25 = 25$ m

$l = 25 + 25 = 50$ m

61. After 2 yr, the total amount of money in an account that pays interest rate r (in decimal form), compounded annually, is given by $P + Pr + (P + Pr)r$. Factor to show that the given expression can be written as $P(1 + r)^2$.

$P + Pr + (P + Pr)r$

$= P(1 + r) + Pr(1 + r)$

$= (P + Pr)(1 + r)$

$= P(1 + r)(1 + r)$

$= P(1 + r)^2$

Section 5.5: 1–17, 21–23, 55–61, 93, 95 (page 455)

Fill in the missing factor

1. $\mathbf{x^2 - 4x + 3}$ $= (x - 1)(x - 3)$ $(3 = 3\times\ 1)$

3. $\mathbf{x^2 + 12x + 35}$ $= (x + 5)(x + 7)$ $(35 = 7 \times 5)$

5. $\mathbf{x^2 + 2xy - 8y^2}$ $= (x - 2y)(x + 4y)$ $(-8y^2 = -2y \times 4y)$

Factor if possible

7. $\mathbf{x^2 + 7x + 12}$

   $= (x + 3)(x + 4)$

   (factors of 12:1,12,6,2,3,4)

   $12 = 4 \times 3$

   $7 = 4 + 3$

9. $\mathbf{n^2 - 12n + 35}$

   $= (x - 5)(x - 7)$

   (factors of 35:1,35,5,7)

   $35 = 5 \times 7$

   $12 = 5 + 7$

11. $\mathbf{t^2 + 2t - 48}$

    $= (x + 8)(x - 6)$

    (factors of 48:1,48,2,24,4,12,6,8)

    $48 = 6 \times 8$

    $2 = 8 - 6$

13. $\mathbf{x^2 - 3x - 54}$

    $= (x - 9)(x + 6)$

    (factors of 54:1,54,2,27,6,9)

15. $\mathbf{18 - 7y - y^2}$

    $= -(y^2 + 7\,y - 18)$

    $= -(y + 9)(y - 2)$

    $= (y + 9)(2 - y)$

    (factors of 18:1,18,2,9,3,6)

17. $\mathbf{x^2 + 12x + 36}$

    $= (x + 6)(x + 6) = (x + 6)^2$

    (factors of 36:1,36,2,18,4,9,3,12,6)

21. $\mathbf{x^2 - 5xy + 6y^2}$

    $(x - 2y)(x - 3y)$

    (factors of $6y^2$:1y,6y,2y,3y)

23. $\mathbf{a^2 - 2ab - 15b^2}$

    $(a - 5b)(a + 3b)$

    (factors of $15b^2$:1b,15b,3b,5b)

55. $\mathbf{3x^2 + 11x + 6}$

    $= (3x + 2)(x + 3)$

    factors:1,6,2,3

57. $\mathbf{2a^2 - 13a + 18}$

    $= (2a - 9)(a - 2)$

    factors:1,18,2,9,3,6

59. $\mathbf{4t^2 + 4t - 15}$

    $= (2t - 3)(2t + 5)$

    factors:1,15,3,5

61. $\mathbf{6n^2 - n - 12}$

    $= (3n + 4)(2n - 3)$

    factors:1,12,3,4,2,6

93. A city parks department increased the size of a rectangular ice-skating rink in its largest park by adding x ft to the length and width. The new rink has an area given by ($x^2 + 140x + 4000$) sq. ft.

a. Factor the expression:
some factors: 1,4000,2,2000,4,1000,8,500,10,400,20,200,40,100,80,50
$x^2 + 140x + 4000 = (x + 40)(x + 100)$

b. What were the dimensions of the original ice-skating rink?:
Area = Length x Width = $(x + 40)(x + 100)$ sq. ft.
New length = 100 + x ft., so original length = 100 ft.
New width = 40 + x ft., so original width = 40 ft.

95. The height (in feet) above the ground of an object t sec after it is thrown downward

from a height of 192 ft. with an initial velocity of 64 ft. per sec is given by the polynomial $192 - 64t - 16t^2$. Factor this polynomial.

$-16(t^2 + 4t - 12)$
$= -16(t + 6)(t - 2) = 16(2 - t)(t + 6)$ ft.
factors: 1,12,2,6,3,4