

CHAPTER 5

Rational Functions, Equations, and Inequalities

Getting Started, pp. 246–247

1. Examine the coefficient for each term. To factor each expression, you will need two factors of the coefficient of the third term whose sum is the coefficient of the second term. If the coefficient of the first term is not 1, then you will have to consider the factors of that coefficient too. If the expression doesn't factor easily you can use the quadratic formula.

a) $x^2 - 3x - 10$

$-5 \times 2 = -10; -5 + 2 = -3$

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

b) $3x^2 + 12x - 15$

$3(x^2 + 4x - 5)$

$5 \times -1 = -5; 5 + -1 = 4$

$3(x + 5)(x - 1)$

c) $16x^2 - 49$

Notice that this is the difference of two squares.

This means that the factored form of the expression will be $(4x - 7)(4x + 7)$.

d) $9x^2 - 12x + 4$

Notice that the coefficients of the first and third terms are squares. Since the coefficient of the second term is negative, the factors of the coefficient of the third term will also probably be negative. The factored form of the expression is $(3x - 2)(3x - 2)$.

e) $3a^2 + a - 30$

This is a trinomial of the form $ax^2 + bx + c$ where $a \neq 0$, and it has no common factor. The expression can be factored using decomposition by finding two numbers whose sum is 1 and whose product is $(3)(-30) = -90$. The numbers are -9 and 10 . These numbers are used to decompose the middle term.

$3a^2 - 9a + 10a - 30$

$= 3a(a - 3) + 10(a - 3)$

$= (a - 3)(3a + 10)$

f) $6x^2 - 5xy - 21y^2$

This trinomial can again be factored by decomposition. Find two numbers whose sum

is -5 and whose product is $(6)(-21) = -126$. The numbers are -14 and 9 . These numbers are used to decompose the middle term.

$6x^2 - 14xy + 9xy - 21y^2$

$= 2x(3x - 7y) + 3y(3x - 7y)$

$= (2x + 3y)(3x - 7y)$

2. a) $\frac{12 - 8x}{4}$

$= \frac{4(3 - 2x)}{4}$

$= 3 - 2x$

b) $\frac{6m^2n^3}{18m^2n}$

$= \frac{6m^2n(n)^2}{6m^2n(3m)}$

$= \frac{n^2}{3m}, m \text{ and } n \neq 0$

c) $\frac{9x^3 - 12x^2 - 3x}{3x}$

$= \frac{3x(3x^2 - 4x - 1)}{3x}$

$= 3x^2 - 4x - 1$

$x \neq 0$

d) $\frac{25x - 10}{5(5x - 2)^2}$

$= \frac{5(5x - 2)}{5(5x - 2)(5x - 2)}$

$= \frac{1}{5x - 2}$

$x \neq \frac{2}{5}$

e) $\frac{x^2 + 3x - 18}{9 - x^2}$

$= \frac{(x - 3)(x + 6)}{(3 - x)(3 + x)}$

$= \frac{-(3 - x)(x + 6)}{(3 - x)(3 + x)}$

$= \frac{x + 6}{3 + x}, x \neq -3, 3$

Nelson Calculus Solutions

Peter Jonathan Baddoo



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