Section 1.6b Other Types of Equations

Review of Negative Exponents

LSU Video "Negative Exponents" *is available on the course website.*

If a is a real number other than 0 and n is an integer, then $a^{-n} = \frac{1}{a^n}$.

Review of Evaluating Expressions of the Form $a^{\frac{1}{n}}$

LSU Video "Rational Exponents" *(0:00 – 7:15) is available on the course website.*

Definition of $a^{\frac{1}{n}}$**:** If n is an integer greater than 1 and $\sqrt[n]{a}$ is a real number, then $a^{\frac{1}{n}} = \sqrt[n]{a}$.

Review of Solving Quadratic Equations

Recall from section 1.4 that some quadratic equations can be solved by factoring and then using the zero-product property and that quadratic equations of the form $x^2 - c = 0$ by using the square root property.

Review of Solving Rational Equations

Recall from section 1.1 that a rational equation is an equation consisting of one or more rational expressions with any other expressions of the equation being polynomials. Here are some examples of rational equations.

$\frac{1}{x} = 7$ $\qquad$ $\frac{2}{x-5} = -3$ $\qquad$ $x^{-1} = \frac{1}{4}$

To solve a rational equation multiply both sides of the equation by the LCD. Remember to check for extraneous solutions.

Topic 5: Solving Radical Equations of the Form $\sqrt[n]{x} = c$

To solve a radical equation of the form $\sqrt[n]{x} = c$ raise each side of the equation to the appropriate power to eliminate the radical. When the index of the radical is even, be sure to check for extraneous solutions.

Objective 2: Solving Equations that are Quadratic in Form ("Disguised Quadratics")

Quadratic equations of the form $ax^2 + bx + c = 0,\ a \neq 0$ are relatively straight-forward to solve since we know several methods for solving quadratics. Sometimes equations that are not quadratic can be made into a quadratic equation by using a **substitution**. Equations of this type are said to be *quadratic in form* or *"disguised quadratics"*. These equations typically have the form $au^2 + bu + c = 0, a \neq 0$ after an appropriate substitution.

Original Equation	**Identify *u*.**	**Find u^2.**	**Make the substitutions.**
$2x^4 - 11x^2 + 12 = 0$	$u = x^2$	$u^2 = (x^2)^2 = x^4$	$2u^2 - 11u + 12 = 0$
$\left(\frac{1}{x-2}\right)^2 + \frac{3}{x-2} - 15 = 0$	$u = \frac{1}{x-2}$	$u^2 = \left(\frac{1}{x-2}\right)^2$	$u^2 + 3u - 15 = 0$
$x^{2/3} - 9x^{1/3} + 8 = 0$	$u = x^{1/3}$	$u^2 = (x^{1/3})^2 = x^{2/3}$	$u^2 - 9u + 8 = 0$
$3x^{-2} - 5x^{-1} - 2 = 0$	$u = x^{-1}$	$u^2 = (x^{-1})^2 = x^{-2}$	$3u^2 - 5u - 2 = 0$