

MATH 1314

Section 2.5

Other Techniques for Solving Equations

Solving by Factoring:

Factoring can be used to solve many types of equations. Always begin by Factoring Completely. Then, set each factor equal to zero.

Find all solutions to

$$x^3 + 3x^2 + 2x + 6 = 0$$

Find all the solutions of $x^3 = x$

Equations Involving Fractions:

Option 1: Rewrite all fractions so that they have the same denominator, then drop all denominators from the equation.

or

Option 2: Multiply the entire equation by the LCD to clear the fractions.

Then: Solve normally.

Be advised: If your answer makes any of the original fractions undefined, it must be rejected!!

$$\frac{4}{x-1} + \frac{3}{x} = 3$$

Equations involving radicals:

If an equation involves a square root (also called a radical), you must isolate the radical, square both sides, and solve the remaining equation. Be certain to check your answers!

Find all solutions to $\sqrt{x + 8} - 2 = x$

Extraneous Solutions: In a radical solution, you may “create” additional answers that are not correct. These must be rejected!

Find all solutions to $\sqrt{3x + 1} - 1 = x$

Solve the following: $x^3 = 9x$

Solve the following: $x + \sqrt{x + 1} = 5$

Solve the following: $\frac{8}{x+1} + \frac{3}{x} = 3$

Solving by Substitution:

When a function looks, “almost” quadratic, you may want to solve it by relating it to another function.

$$x^{10} - x^5 - 6 = 0$$

If the exponents go “full amount \rightarrow half amount \rightarrow nothing” then you can rewrite as a quadratic.

Let $u = x^5$, then

$$x^{10} - x^5 - 6 = 0 \rightarrow u^2 - u - 6 = 0$$

$$x^{10} - x^5 - 6 = 0$$

$$u = x^5$$

$$u^2 - u - 6 = 0$$

$$x^{1/2} + 2x^{1/4} - 15 = 0$$

$$2(x + 5) - \sqrt{x + 5} - 10 = 0$$

$$\frac{1}{x^2} + \frac{5}{x} + 6 = 0$$

What substitution should be made?

How does the equation re-write?

What is the value(s) of u ?

What is the value(s) of x ?

$$x + 4\sqrt{x} - 5 = 0$$

$$x + 4\sqrt{x} - 5 = 0$$