Math 1111 – Other Types of Equations

Objectives:

1. Solve polynomials by factoring

2. Solve radical equations

3. Solve equations involving absolute value

4. Solving equations for a specific variable

This section will show how solve other types of equations such as polynomials, radicals, absolute value, and equations for a specific variable.

**Objective 1:** Solve polynomial equation by factoring.

We know that a polynomial is an expression that can be written in the form

anxn + … + a2x2 + a2x + a0

where n is a positive integer and an, …, a0 are real numbers and an ≠ 0.

Setting the polynomial equal to zero gives a polynomial equation. The total number of solutions (real and complex) to a polynomial equation is equal to the highest exponent n.

When we are faced with an equation containing polynomials of degree higher than 2, we can often solve them by factoring.

Solve a polynomial equation by factoring.

1. Isolate all nonzero numbers to one side through adding or subtracting, and equal zero on the other side.

2. Factor the GCF, if applicable.

3. Factor the remaining term using trial and error, “ac” method, square root, or grouping.

4. Set all of the factors to zero and solve the equations. The highest exponent will indicate the number of solutions (real and complex).

5. Check all of the solutions into the original equation.

Example #1: Solve each polynomial equation.

A. 5x4 – 80x2 = 0

B. x4 - 25x2 – 144 = 0

C. x3 + x2 + 9x + 9 = 0

**Objective 2:** Solve radical equations.

An equation in which a variable is in the radicand (under the radical sign) of a radical expression is called a radical equation.

Radical equations may have one or more radical terms, and are solved by eliminating each radical, one at a time. We have to be careful when solving radical equations, as it is not unusual to find extraneous solutions, roots that are not, in fact, solutions to the equation. These solutions are not due to a mistake in the solving method, but result from the process of raising both sides of an equation to a power. However, checking each answer in the original equation will confirm the true solutions.

Solving a radical equation.

1. Isolate the radical expression on one side of the equal sign. Put all remaining terms on the other side.

2. If the radical is a square root, then square both sides of the equation. If it is a cube root, then raise both sides of the equation to the third power. In other words, for an *n*th root radical, raise both sides to the *n*th power. Doing so eliminates the radical symbol.

3. Solve the remaining equation.

4. If a radical term still remains, repeat steps #1-2.

5. Check all of the solutions into the original equation.

Note: When you are squaring both sides of the equation, do not square each of the terms.

Example #2: Solve each radical equation.

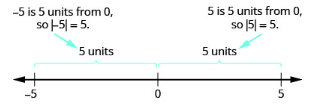
A.

B.

C.

**Objective 3:** Solve absolute value equations.

When we have an equation that has an absolute value, it does not matter if the number is positive or negative inside of the absolute value bars because this represents the distance from zero on the number line. Remember that an absolute value cannot be a negative number.



Absolute Value Equations: For any algebraic expression, *u*, and any positive real number, *a*,

if | *u* | = *a*

then *u* = - *a* or *u* = *a*

Solving an absolute value equation.

1. Isolate the absolute value expression on one side of the equal sign.

2. Set up two equations, one for +*a* and one for -*a*.

3. Check your answer in the original equation.

Example #3: Solve each absolute value equation.

A. | 3x – 5 | = 10

B. | 5x – 4 | - 3 = 8

C. 3 + 2 | x – 4 | = 11

D. 2 | x – 5 | + 3 = 9

E. | 5x – 1 | = | 2x + 3 |

**Objective 4:** Solve problems for a specific variable.

May application problems involve formulas in which we need to solve for a specific variable, since most formulas contain more than one variable. To solve for a formula means that we rewrite the equation so that the variable we desire is isolated on one side of the equation. This does not mean that we will be solving for a numerical answer.

To isolate the specific variable, we need to use the properties of addition/subtraction, division/multiplication, and sometimes we need to find the LCD.

Example #4: Solve each of the problems for the specified variable.

1. A = ½ bh, for h (area of right triangle)

2. V *=* , for h (volume of a right circular cone)

3. F = C + 32, for c (Fahrenheit temperature)

4. A = P + Prt, for P (Interest)

5. , for c (work)

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