

Linear Equations in One Variable

Section 2.1, Intermediate Algebra

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Basics

- *Definition* – An equation is a statement expressing equality between mathematical expressions. Like any statement, equations can be true, false, or only true under certain conditions.
- *Definition* – A solution is any value of 'x' that, when substituted into the equation, results in a true statement. A solution is a condition under which the equation is true.

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Expression vs Equation

- *Definition* – A conditional statement is one that can be judged as true or false under a given set of circumstances.
- *Definition* – An expression is a collection of numbers and variables that are added, subtracted, multiplied, and/or divided in some combination.
- An equation is a conditional statement. An expression is NOT a conditional statement.

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Determining if a Value is a Solution

- *Process*
 1. Substitute the given value for 'x' into the equation everywhere there is an 'x'.
 2. Simplify both sides of the equation.
 3. If simplifying results in a true statement (i.e. $5=5$ or $-2=-2$), then the value of 'x' is a solution.
 4. If it results in a false statement (i.e. $-1=3$ or $7=8$), then the value of 'x' is NOT a solution.

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PAUSE

- Please stop now and look at Example 11 for section 2.1.
- Once you have finished looking at this example, please continue viewing this presentation.

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Properties of Equality

- *Property* – The Addition Property of Equality states that you may add/subtract the same expression to/from both sides of an equation and still maintain equality.
- *Property* – The Multiplication Property of Equality states that you may multiply/divide the same expression to/from both sides of an equation and still maintain equality.

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PAUSE

- Please stop now and look at the following examples:
 - [Example 2](#)
 - [Example 19](#)
 - [Example 23](#)
 - [Example 35](#)
- Once you have finished looking at these examples, please continue viewing this presentation.

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Equations with Multiple Fractions

- Trick – Multiply both sides of the equation by the common denominator (LCD) of all the fractions on both sides of the equation.

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PAUSE

- Please stop now and look at the following examples:
 - [Example 43](#)
 - [Example 51](#)
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Conditional Equations

- *Definition* – A conditional equation is an equation that has a finite number of solutions.
- *Definition* – Finite number means a limited number (the opposite of infinite).
- Examples of Conditional Equations :
- ALL of the examples that we have looked at so far....

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Identity

- *Definition* – An identity is an equation that has an infinite number of solutions.
- This can only happen if the equation is true in an infinite number of cases, for an infinite number of values. In other words, the left hand side almost always equals the right hand side of the equation.
- Example – The equation $x=x$ is an identity, since any value 'x' will always equal itself.

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Inconsistent Equation

- *Definition* – An inconsistent equation is an equation that has no solution.
- This can only happen if the equation is impossible. This means there are NO values that can make the equation result in a true statement.
- Example – The equation $x+1=x$ is an inconsistent equation, since no number can equal 'itself plus one.'

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PAUSE

- Please stop now and look at the following examples:
 - [Example 59](#)
 - [Example 61](#)
 - [Example 71](#)
- Once you have finished looking at these examples, please continue viewing this presentation.

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Miscellany

- The end of the section has an assortment of problems.
- Be careful to follow the Order Of Operation. When simplifying on one side of the equation, you **MUST** multiply/divide (distribute) **BEFORE** adding/subtracting (combining like-terms).

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Pause

- Please stop now and look at the following examples:
 - [Example 75](#)
 - [Example 93](#)
- Once you have finished looking at these examples, you have completed the lecture for this section.

End of Presentation

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