

Lesson 7 MA 152 Section 1.1 and 1.2 (part 1)

Definitions:

An **equation** is a statement indicating that two quantities are equal. Each unknown (represented by a letter) in an equation is a **variable**. A **solution** (or root) of an equation is a value that makes a true statement when replaced for the variable. A **solution set** is the set of all solutions. To **solve** an equation is to find the solution(s).

No value can be a solution of an equation that makes a denominator equal zero. Any equation that has a variable in a denominator **may have** restrictions on what value or values that may replace it. For example; in the equation $\frac{x^2 - 4}{x - 2} = -2$, x could not equal 2. The value 2 is *restricted* from possible values for x .

More Definitions:

Some equations are true no matter what value is replaced for the variable. Such an equation is called an **identity**. For example $x^2 + 2x = x(x + 2)$ is an identity. Some other equations, the variable may never be replaced by any value to make the equation true. This type of equation is called a **contradiction**. An example of a contradiction is the equation $2x = 2x - 5$. An equation that has a finite number of solutions is a **conditional equation**. An example of a conditional equation is $4x + 2 = 3x - 5$ (solution is -7).

A **linear equation** is a first-degree polynomial equation and can be written in the form $ax + b = 0$ ($a \neq 0$).

Ex 1: Solve each equation and categorize.

a) $5x + 3 = 2(3 - 4x)$

When the variables
'drop out' on each
side:
false: no solution

b) $2(a + 1) = 3(a - 2) - a$

true: infinite
solutions

c) $3(x - 3) = \frac{6x - 18}{2}$

Ex 2: Solve each equation.

$$a) \quad \frac{3+x}{3} + \frac{x+7}{2} = 4x + 1$$

$$b) \quad (x-2)(x-3) = (x+3)(x+4)$$

$$c) \quad 2(r+2) + (r+3)^2 = r(r+5) + 2\left[\frac{17}{2}\right] + r\left[\right]$$

A **rational equation** is one that contains one or more rational expressions (fractions).
Remember: no solutions can make zero denominators.

Ex 3: Solve each.

$$a) \quad \frac{3}{x-2} + \frac{1}{x} = \frac{3}{x-2}$$

$$b) \quad \frac{2x+3}{x^2+5x+6} + \frac{3x-2}{x^2+x-6} = \frac{5x-2}{x^2-4}$$

$$c) \quad \frac{a}{a+2} - 1 = \frac{3a+2}{a^2+4a+4}$$

A **formula** is an equation with more than one variable (sometimes several variables). Sometimes a formula may be written in as an equivalent in terms of a different variable. For example $F = \frac{9}{5}C + 32$ is equivalent to $C = \frac{5}{9}(F - 32)$.