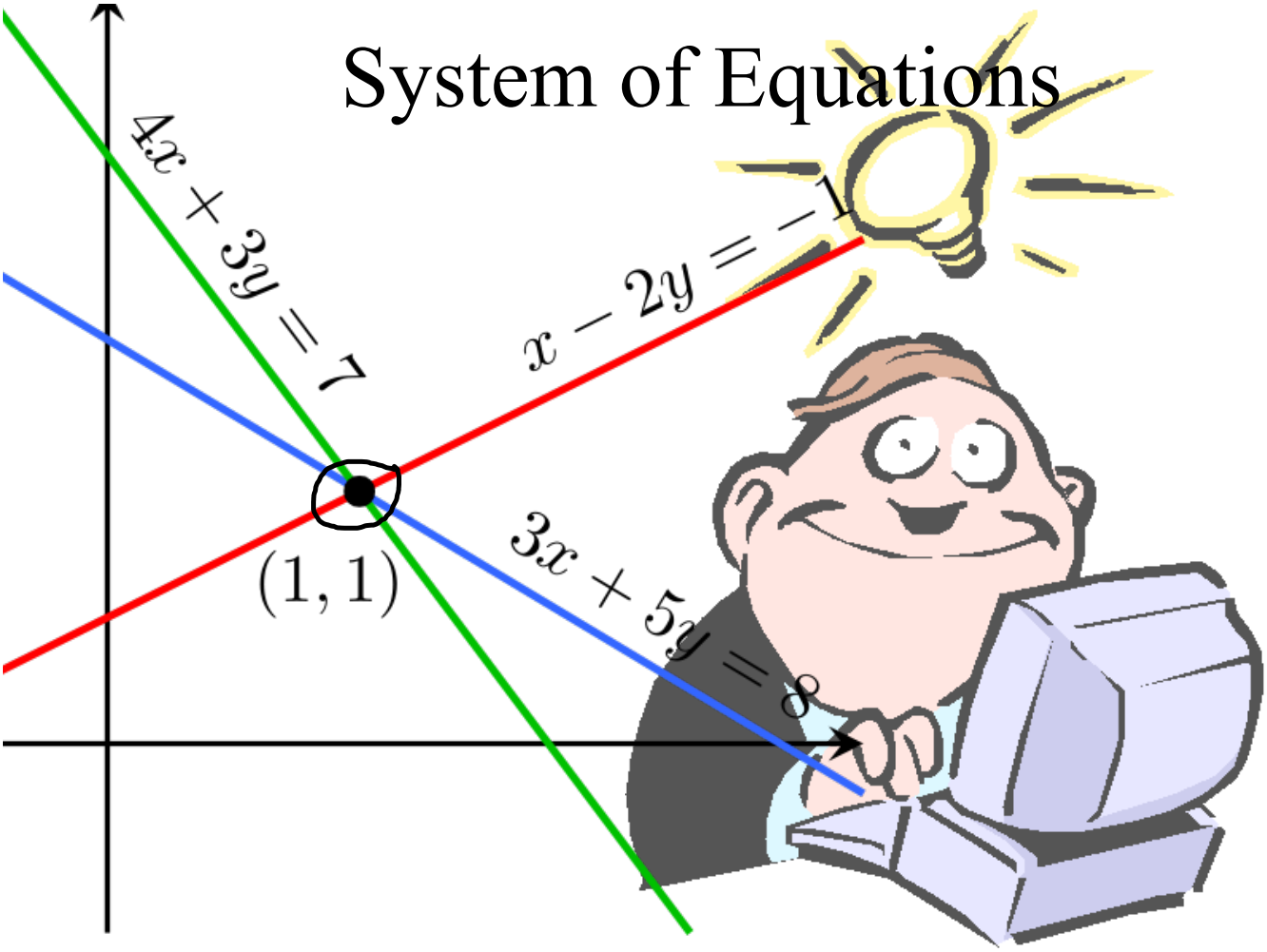
System of Equations



Elimination using Addition

Consider the system

$$\begin{array}{r} x - 2y = 5 \\ +\ 2x + 2y = 7 \\ \hline \end{array}$$

Elimination using Addition

Consider the system

$$\begin{array}{rl} & x - 2y = 5 \\ + & 2x + 2y = 7 \\ \hline & 3x = 12 \end{array}$$

touch

Lets add both equations to each other

$$\frac{3x}{3} = \frac{12}{3}$$

$$x = 4$$

Elimination using Addition

Consider the system

$$\begin{array}{rl} x - 2y = 5 & \leftarrow \\ +\ 2x + 2y = 7 & \leftarrow \\ \hline 3x \quad = 12 & \end{array}$$

Lets add both equations to each other

solve for x

$x = 4$

ANS: (4, y)

Now solve for y (HOW???)
- sub the value of x into one of the equations and solve for y

$$x - 2y = 5$$
$$4 - 2y = 5$$
$$-2y = 1$$
$$y = \frac{-1}{2}$$

intersection point (4, - 0.5)

Elimination using Addition

Same process as before
You can choose to eliminate either x or y

$$x + 3y = 14$$
$$-x + 4y = 7$$

Who would you eliminate??

Elimination using Addition

$$\begin{array}{rl} & x + 3y = 14 \\ + & -x + 4y = 7 \end{array}$$

Add this time

Elimination using Addition

$$x + 3y = 14$$
$$-x + 4y = 7$$
$$7y = 21$$

Add this time

$$y = 3$$

$$(x, 3)$$

solve for x

$$x + 3y = 14$$

$$x + 3(3) = 14$$
$$x + 9 = 14$$
$$x = 14 - 9$$
$$x = 5$$

Solve the system of equations

Example 1)

$$\begin{array}{r} 2x + y = 5 \\ +\ 3x - y = 15 \\ \hline \end{array}$$

$$\frac{5x}{5} = \frac{20}{5}$$

$$x = 4$$

$$2(4) + y = 5$$

$$8 + y = 5$$

$$-8 \quad -8$$

$$y = -3$$

Example 2)

$$\begin{array}{r} \left.\begin{array}{l} 6y + x = 11 \\ 2y - x = 5 \end{array}\right\} + \\ \hline \end{array}$$

$$\frac{8y}{8} = \frac{16}{8}$$

$$y = 2$$

$$6(2) + x = 11$$

$$12 + x = 11$$

$$-12 \quad -12$$

$$x = -1$$

Elimination Using Subtraction

$$\begin{array}{r} 6x + 11y = -5 \\ -\ 6x + 9y = -3 \\ \hline \end{array}$$

Careful you are subtracting all of the second
(switch all signs on the second equation)

May want to change signs and add

Elimination Using Subtraction

$6x + 11y = -5$

$-(6x + 9y = -3)$

Careful you are subtracting all of the second
(switch all signs on the second equation)

$+\ 6x + 11y = -5$

$-6x - 9y = 3$

Elimination Using Subtraction

Careful you are subtracting all of the second
(switch all signs on the second equation)

$$6x + 11y = -5$$
$$-6x - 9y = +3$$

$$\frac{2y}{2} = \frac{-2}{2}$$

$$y = -1$$

solve for x

$$6x + 11y = -5$$
$$6x + 11(-1) = -5$$
$$6x - 11 = -5$$
$$6x = -5 + 11$$
$$6x = 6$$
$$x = 1$$

Intersection (1, -1)

Use subtraction to eliminate

a) $7x + 7y = 0$

$-(7x - y = 24)$

$8y = -24$

$\frac{8y}{8} = \frac{-24}{8}$

$y = -3$

$7x + 7(-3) = 0$

$7x - 21 = 0$

$7x = 21$

$\frac{7x}{7} = \frac{21}{7}$

$x = 3$

b) $7x + 6y = -10$

$-(9x + 6y = -30)$

$7x + 6y = -10$

$+ -9x - 6y = 30$

$-2x = 20$

$\frac{-2x}{-2} = \frac{20}{-2}$

$x = -10$

$7(-10) + 6y = -10$

$-70 + 6y = -10$

$6y = 60$

$\frac{6y}{6} = \frac{60}{6}$

$y = 10$