MFM2P – Course Review

Unit 3: Equations of Lines

The Basics

Equation

$y = mx + b$

D.V. slope I.V. y-intercept

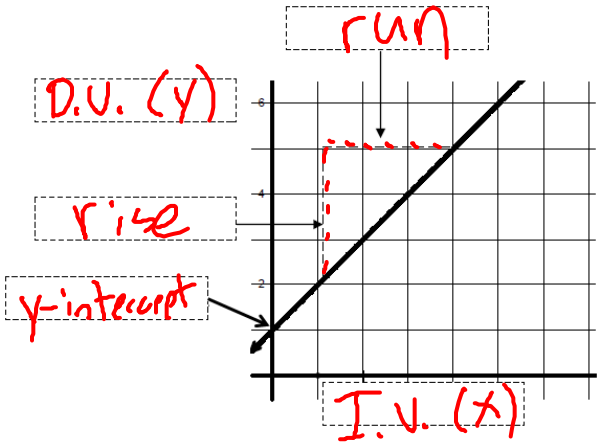
Table of Values

I.V. (Time)	D.V. (Distance)
0	0
1	120
2	240
3	360
4	480

run rise y-intercept first differences

$\text{slope} = \frac{\text{rise}}{\text{run}}$

Graph



Determining Equations from Tables and Graphs

To determine the equation of a line in **y = mx + b** form from a graph or table, you must first determine the slope or rate of change using the rise and the run; this is your ***m*** in the equation.

Next, you must determine the y-intercept, also known as the initial value. It is the value of the dependent variable (often y) when the independent variable (often x) is zero; this is your ***b*** in the equation.

Examples: Determine the equations of the lines represented in table and graph form below.

x	y
0	-15
4	-7
8	1
12	9
16	17
20	25

b=-15

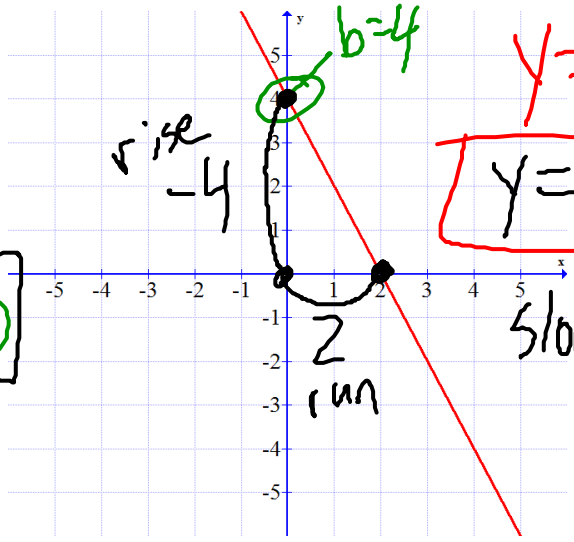
y=mx+b

run +4

rise +8

$y = 2x - 15$

$slope = \frac{8}{4} = 2$



y=mx+b

$y = -2x + 4$

$slope = \frac{-4}{2} = -2$

Determining Equations Given Two Points (x_1, y_1) and (x_2, y_2)

1. Determine the slope of the line (***m***), using the equation: $m = \frac{y_2 - y_1}{x_2 - x_1}$ (rise / run)

2. Determine the y-intercept of the line (***b***), by plugging the slope (***m***) and a point (***x***, ***y***) into $y = mx + b$ and solving for ***b***.

Example

x_1 y_1 x_2 y_2

Determine the equation of the line through the points (-1, 4) and (4, -6).

$m = \frac{-6-4}{4-(-1)} = \frac{-10}{5}$

$m = -2$

$y = -2x + 2$

$y = mx + b$

$4 = (-2)(-1) + b$

$4 = 2 + b$

$-2 \quad -2$

$b = 2$

Rearranging Standard Form Equations into y = mx + b Form

Sometimes we are given equations in standard form (**Ax + By = C**) and we need to rearrange them into **y = mx + b** form in order to graph. Basically, we need to isolate or rearrange for ***y***.

Example

Rearrange $6x + 3y = 9$ into **y = mx + b** form.

$6x + 3y = 9$

$-6x \quad -6x$

$\frac{3y}{3} = \frac{-6x}{3} + \frac{9}{3}$

$y = -2x + 3$

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Unit 4: Linear Systems

The Basics

A linear system is simply two linear equations considered at the same time. The solution to a linear system is the point where the two lines meet, often referred to as the point of intersection.

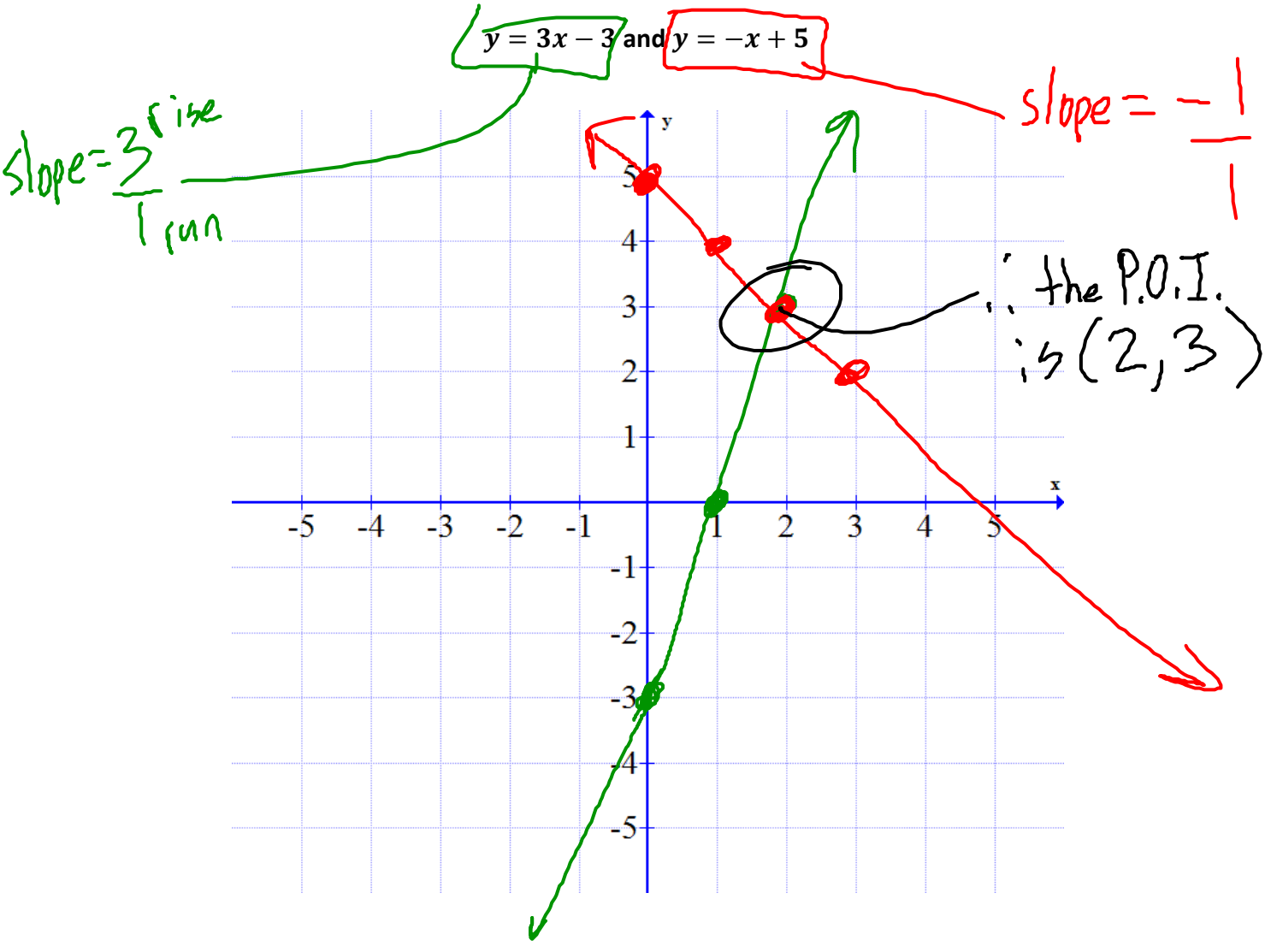
We can solve linear systems by graphing or by substitution.

Solving by Graphing

To solve by graphing, graph both lines and find the point where the lines intersect. This point of intersection is the solution to the linear system.

Example: Solve the linear system below by graphing.

$y = 3x - 3$ and $y = -x + 5$



Solving by Substitution

To solve by substitution, ensure the equations are both written in terms of the same variable, set them equal and solve for one variable. Then substitute the value you find into either equation to solve for the other variable.

Example: Solve the linear system below by substitution.

$E = 8h + 30$ and $E = 10h + 20$

$8h + 30 = 10h + 20$

$-10h \quad -10h$

$-2h + 30 = 20$

$-30 \quad -30$

$\frac{-2h}{-2} = \frac{-10}{-2}$

$h = 5$

$E = 8h + 30$

$= 8(5) + 30$

$= 40 + 30$

$= 70$

$E = 10h + 20$

$= 10(5) + 20$

$= 50 + 20$

$= 70$

∴ after 5 hours, both jobs pay $70