Section 1.1-1.3 - Functions

Note Title 1/23/2008

Defn: Function is a rule that assigns to each input, exactly 1 output.

Ex) $f(x) = x^3$

input: $x = 2$

output: $2^3 = 8$

Notation: $f(x) = \underbrace{x^3}_{\text{"output"}}$

$f(x)$: "input"

Definitions: Domain: set of all possible inputs.

Ex) Find domain of $f(x) = x^3$

Domain: All real numbers

Ex) Find domain of $g(x) = \sqrt{x-3}$

$x - 3 \geq 0$

$x \geq 3$ Domain

Note: Domain could be related to a real world situation...

Definition: Range: Set of all possible outputs

Online HW Example:

$$M(c) = -11c^2 + 10c - 11$$

c	-2	-1	0	1	2
$M(c)$	-75	-32	-11	-12	-35

$$M(-2) = -11(-2)^2 + 10(-2) - 11$$

$$= -11(4) - 20 - 11$$

$$= -44 - 20 - 11 = -75$$

Ex 2 (online)

$$g(p) = -5p^2 + 3p + a$$

(a is some parameter)

p	-2	-1	0	1	2
$g(p)$	$-26+a$		a		

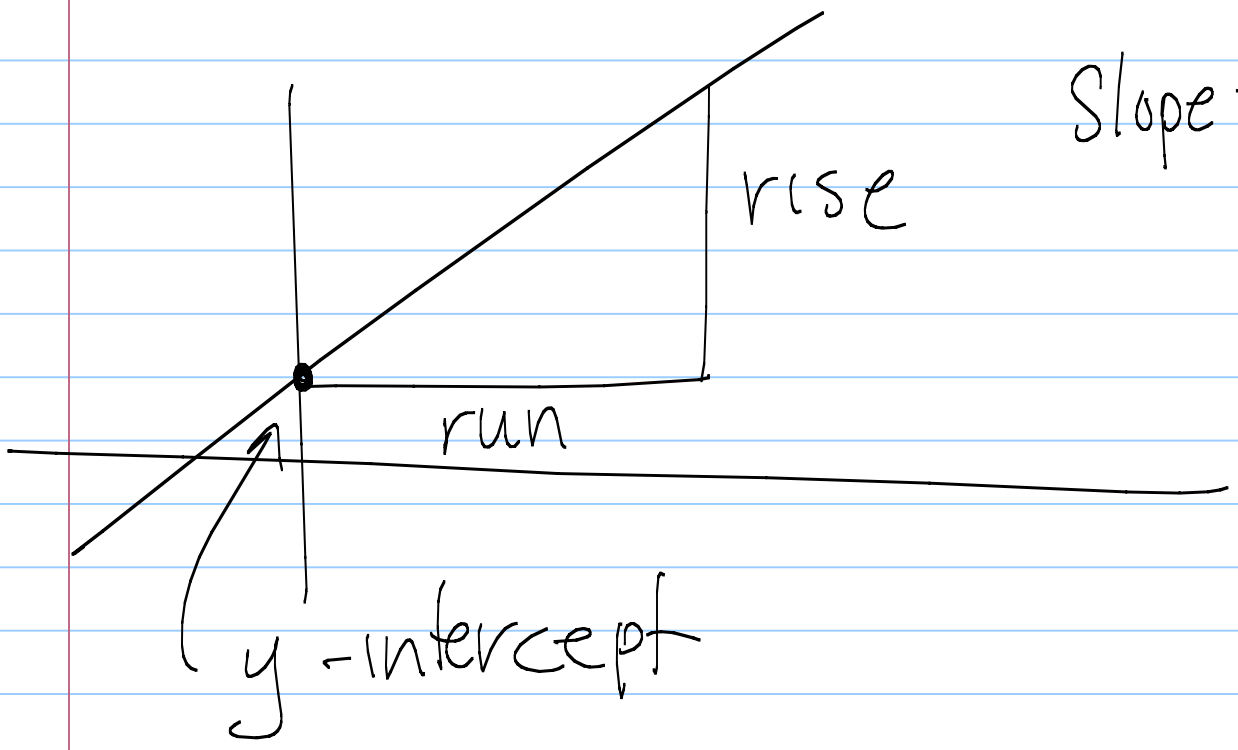
$$g(-2) = -5(-2)^2 + 3(-2) + a$$

$$= -5(4) - 6 + a$$

$$= -20 - 6 + a$$

$$= \underline{-26 + a}$$

Section 1.4. Linear Functions



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

3 forms of lines

① Slope-Intercept form:

$$y = mx + b$$

m: slope

b: y-intercept.

$$f(x) = mx + b$$

Formula for finding m:

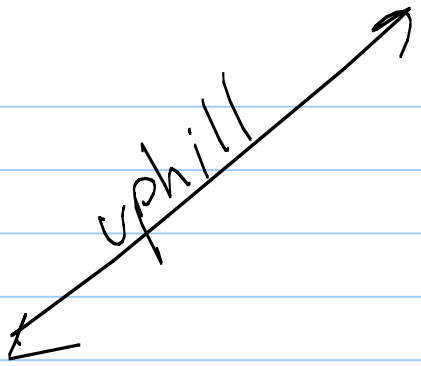
Given 2 pts: (x_1, y_1) and (x_2, y_2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{or} \quad \frac{y_1 - y_2}{x_1 - x_2}$$

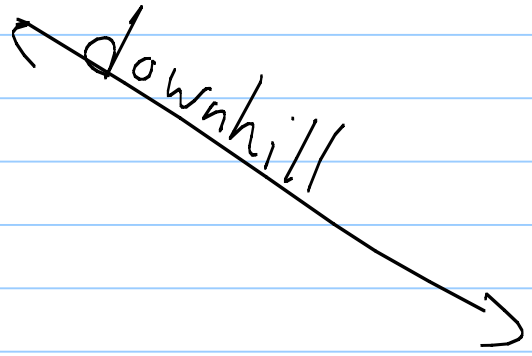
Ex) Find slope of line connecting $(2,3)$ and $(3,8)$.

$$m = \frac{8-3}{3-2} = \frac{5}{1} = 5$$

Positive Slope:



Negative Slope:



Ex] Find equation (in $y=mx+b$ form) of a line with slope $=3$, passing through $(1,4)$

$$y = mx + b$$
$$y = 3x + b$$
$$4 = 3(1) + b$$
$$1 = b$$

$$\boxed{y = 3x + 1}$$

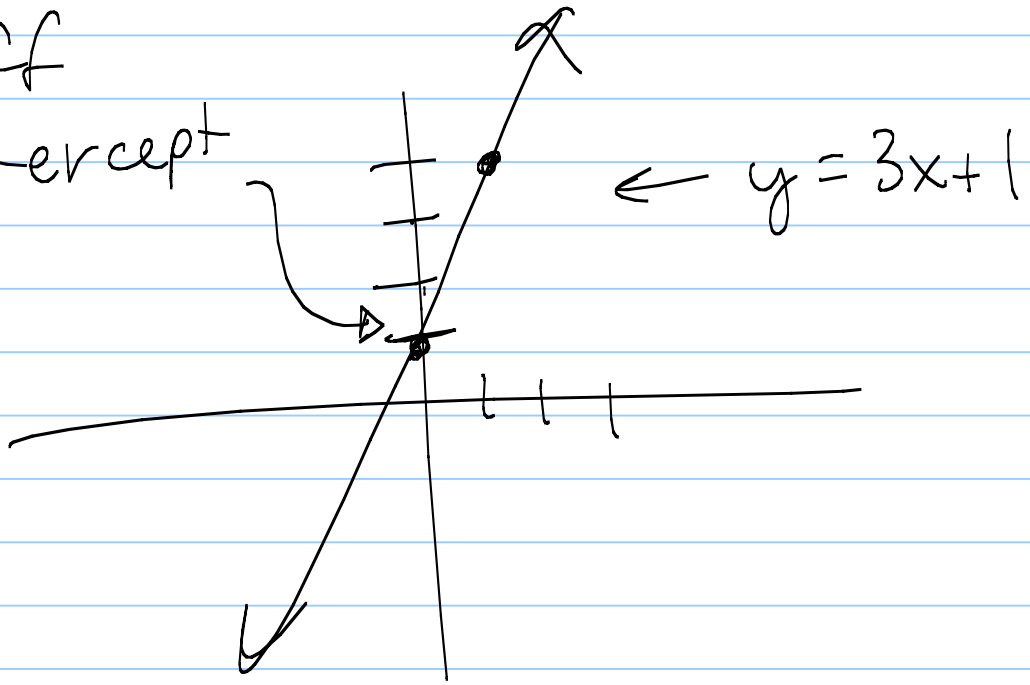
Graph of the line

$y = 3x + 1$:

Mark off

y-intercept

$m = \frac{3}{1}$



② Point-Slope Form

$$y - y_0 = m(x - x_0)$$

((x_0, y_0) is a point on the line.)

Ex) $m = 3$

point: $(1, 4)$

$y - 4 = 3(x - 1)$ ← pt slope

$y - 4 = 3x - 3$

$+4 \qquad +4$

$y = 3x + 1$ ← slope-int.

③ General Form: $Ax + By = C$

(A, B, C real #s)

Ex) $2x + 3y = 24$

↳ $y = -\frac{2}{3}x + 8$

(These are the missing steps from previous problem).

$$2x+3y=24$$

$$\frac{3y}{3} = \frac{-2x}{3} + \frac{24}{3}$$

Linear Equations

#3 (Online HW)

Given equation & solution, find missing coefficient:

$$-6x+8 = \square x - 12$$

$x=3$

(Solution) $-6(3)+8 = \square \cdot 3 - 12$

$\square = 2/3$

$-18+8 = 3\square - 12$

$-10 = 3\square - 12$

$2 = 3\square$

Reminders:

Book HW - due Tues 29th (Jan) 5pm