Q: Does every line has a midpoint?

2/3/20 Monday

1314/0214 College Algebra
Brice
Notes by Nikki Xu
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A: NO

Because lines have infinite lengths

But every line segment has a midpoint.

Suppose a line segment has endpoints (x_1, y_1) and (x_2, y_2)

Then the midpoint of this line segment is $\boxed{\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)}$

Hawkes Practice:

Fill in the ~~bat~~ blank with the following equation: $10x - 8y = 16$.

x	$\boxed{8/5}$	0	2	$\boxed{28/5}$
y	0	$\boxed{-2}$	$\boxed{\frac{1}{2}}$	5

$\rightarrow 10x = 16 + 8y \Rightarrow x = 1.6 + 0.8y$

$x = \frac{8}{5} + \frac{4}{5}y$

$\rightarrow 10x - 16 = 8y \Rightarrow \frac{5}{4}x - 2 = y$

(1) $10x - 8(0) = 16$.

$10x = 16$

$x = \frac{16}{10} = \frac{8}{5}$

(2) $10(0) - 8y = 16$.

$-8y = 16$

$y = -2$

(3) $10(2) - 8y = 16$.

$20 - 8y = 16$.

$-8y = -4$

$y = \frac{1}{2}$

(4) $10x - 8(5) = 16$

$10x - 40 = 16$

$10x = 56$

$x = \frac{56}{10} = \frac{28}{5}$

3.2 Linear Equations in 2 Variables. 2/3/20 Monday

Definition:

Only has x's or y's and #, but no product of x or y.

Standard Form:

x's + y's = #   has to be the lowest (simplified) form.

(1) Hawkes Practice:

$-3x+(y+x)=3.$

simplify: $-3x+y+x=3$

$-2x+y=3$ linear standard form.

(2) Hawkes Practice:

$12x+6xy=9y.$

Not ~~linear~~ linear because 6xy is not a linear term.

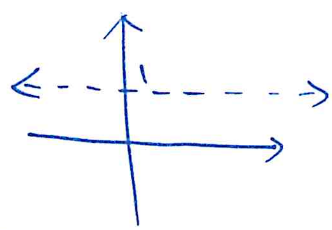
(3) Hawkes Practice:

$-4y=-4$

Simplify: $-4y=-4$

$y=1$

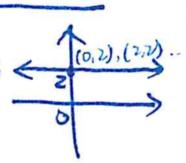
$(0\cdot x+1\cdot y=1)$



There is no x-intercept.

But y-intersept is (0,1).

- Horizontal Line : equation only has y's.

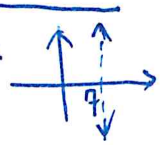
example: 

→ equation of this line is $y=2$.

every point on this line has y-coordinate of 2.

other examples: $3y=17$, $2y=-19$ etc.

- Vertical Line : equation only has x's.

example: 

→ equation of this line is $x=7$.

every point on this line has x-coordinate of 7.

other examples of: $5x=41$, $17x=-92$

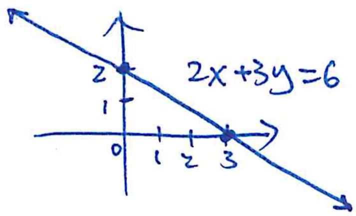
○ Slanted Line : equation has both x's and y's. 2/3/20 Monday.

- example:

Given equation: $2x+3y=6$

Plot this line { (1) Let $y=0$ & solve → $2x+3(0)=6 \Rightarrow 2x=6 \Rightarrow x=3$ $\boxed{(3,0)}$ for x-intercept
(2) Let $x=0$ & solve → $2(0)+3y=6 \Rightarrow 3y=6 \Rightarrow y=2$ $\boxed{(0,2)}$ for y-intercept.

- Notice any slanted line will eventually intersect with both x- and y-axes



- Is the point $(-3,4)$ on the line of $2x+3y=6$?

$2(-3)+3(4) = -6+12 = 6 = 6$ So yes, $(-3,4)$ is on the line.