Math 3 Honors Pre-Calc: Lines Chapter
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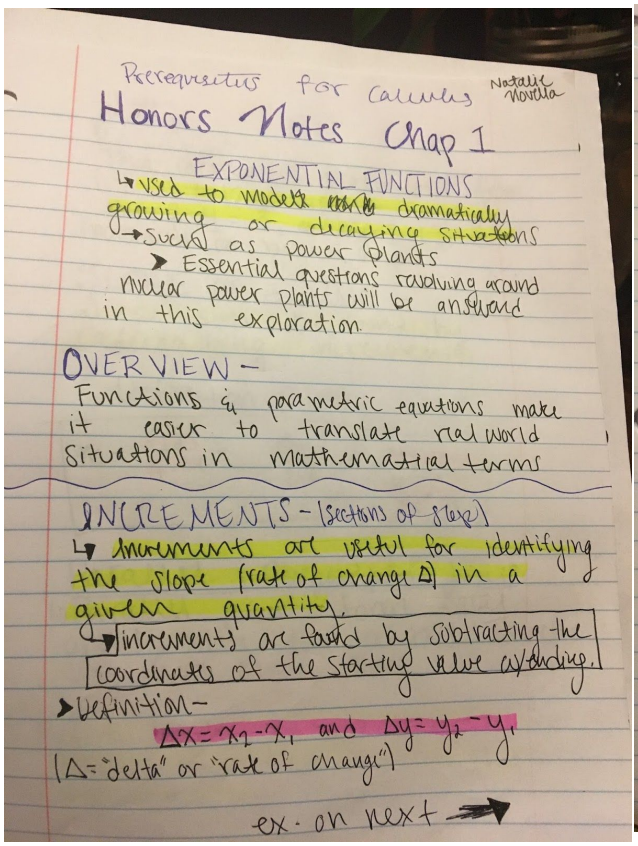
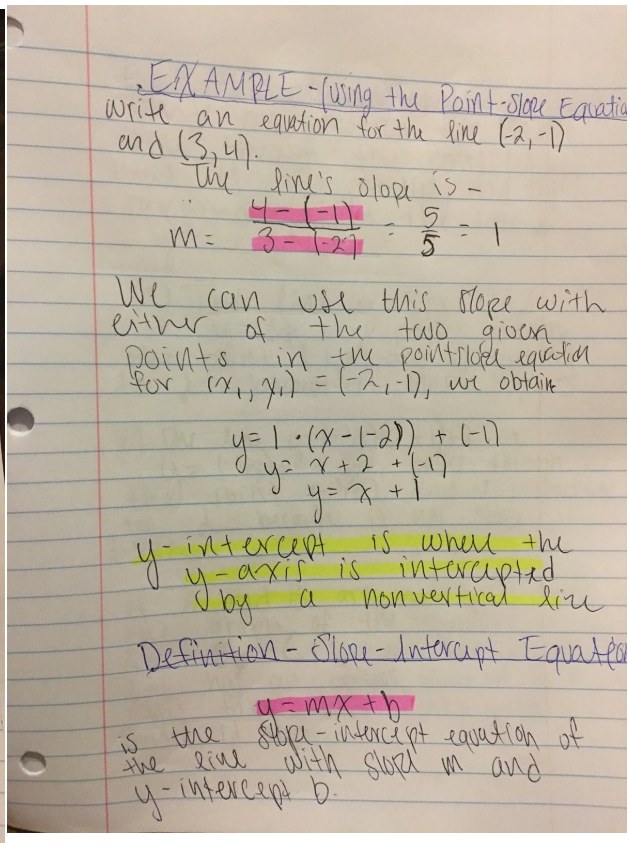
I grappled with the overall note taking process. I wanted to make it as neat and easy to understand as possible so I had to maintain nice handwriting and clear language. I also highlighted important equations in pink and key information in yellow. I believe this made it easier for a reader to grasp the concepts by just skimming through the notes.

I used organization; as explained in the answer above, I tried my hardest to organize my note to make them neat and easy to understand.

Beautiful notes and problem set





Finding increments

EXAMPLE -

The coordinates increments from $(4,-3)$ to $(2,5)$ are:

$\Delta x = 2-4 = -2$, or $\Delta y = 5-(-3) = 8$

increments can be +, -, or 0.

SLOPE OF A LINE -

Slope can be found by calculating increments.

Definition (Slope)

$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Parallel & Perpendicular Lines

- Parallel lines form equal angles with the x-axis. Therefore they have same slope.
- The slope of a perpendicular will be the negative or positive reciprical.

EXAMPLE - (Writing equation for lines)

Write an equation for the line through the point $(-1,2)$ that is (a) parallel, and (b) perpendicular to the line L: $y = 3x - 4$

(a) The line $y = 3(x+1)+2$ or $y = 3x + 5$, passes through the point $(-1,2)$, and is parallel to L because it has a slope 3.

(b) The line $y = (-1/3)(x+1)+2$ or $y = (-1/3)x + 5/3$, passes through the point $(-1,2)$, and is perpendicular to L because it has slope $(-1/3)$.

If A and B are not both zero, the graph of the equation $Ax + By = C$ is a line. Every line has an equation in this form, even lines with undefined slopes.

Definition - General Linear Equation

The equation -

$Ax + By = C$ (A and B not both 0)

in a general linear equation in x and y.

Analyzing and Graphing A General Linear Equation

Find slope & y intercept

$8x + 5y = 20$

$5y = -8x + 20$

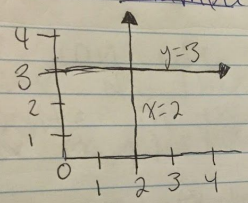
$y = \frac{8}{5}x + 4$

This form reveals: slope $= -\frac{8}{5}$ and $b = 4$

EQUATIONS OF LINES

The vertical line has definition $x = a$. Similarly, horizontal has definition $y = b$.

example - $y = 3$ $x = 2$



Definition (Point Slope Equation) - the equation -

$y = m(x - x_1) + y_1$

is the point-slope equation of the line through the point (x, y) with slope m.

EXAMPLE - (Using Point slope equation) Point $(2, 3)$ with slope $-3/2$.

$y = -\frac{3}{2}(x - 2) + 3$ or $y = -\frac{3}{2}x + 6$

Natalie Moller

Problem Set

1.) Find the value of y if x=3

$y = -2 + 4(3-3)$

$y = -2$

3.) x=5 y=2 $m = \frac{y-3}{x-4}$

$m = \frac{2-3}{2-4} = \frac{-1}{-2} = \frac{1}{2}$

5.) $3(2) - 4(\frac{1}{4}) = 5$ ✓ a

7.) (1,0) and (0,1)

$\sqrt{2}$

9.) $4x - 3y = 7$

$+3y \quad +3y$

$\frac{4x}{3} - \frac{7}{3} = \frac{3y}{3}$

$y = \frac{4}{3}x - \frac{7}{3}$

1.) A(1,2) B(-1,-1)

$\frac{-1-1}{-1-2} = \frac{-2}{-3}$ → Δx, Δy

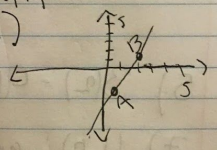
3.) A(-3,1) B(-8,1)

$\frac{-3+8}{1-1} = \frac{5}{0}$ Δx / Δy

5.) A(1,-2) B(2,1)

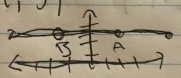
a) b) c)

$\frac{1-2}{-2-1} = \frac{-1}{-3}$



7.) A(2,3) B(-1,3)

no slope



9.) (a) P(2,3) → x=2 (b) y=3

11.) P(0,$-\sqrt{2}$) → x=0 $y = -\sqrt{2}$

13.) point slope equation $= y = 1(x-1)+1$

P(1,1): m=1

15.) Point slope for $m = y = 2(x-0)+3$

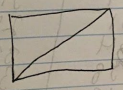
P(0,3) m=2

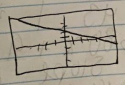
17.) linear equation = $3x - 2y = 0$
(0,0) (2,3)

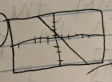
19.) linear equation = $x = -2$
(-2,0) (-2,-2)

21.) Slope intercept equation = $y = 3x - 2$
$m = 3$ $b = -2$

23.) slope intercept = $y = -\frac{1}{2}x - 3$
$m = -\frac{1}{2}$ $b = -3$

25.)  $y = \frac{5}{2}x$

27.)  (a) $-\frac{3}{4}$ (b) 3

29.)  (a) $-\frac{4}{3}$ (b) 4

31.) a) $y = -x$ b) $y = x$
P(0,0) $\perp$: $y = -x + 0$

33.) a) $x = -2$ b) $y = 4$
P(-2,4) $\perp$: $x = 5$

35.)

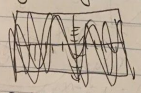
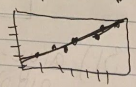
x	1	3	5
f(x)	2	9	16

$m = \frac{7}{2}$ $b = -\frac{3}{2}$

37.) a(-2,3) b(4,y)
$m = -\frac{2}{3}$ $y = -1$

39.)

age (months)	Weight (pounds)
19	27
21	23
24	25
27	28
29	31
31	28
34	32
38	34
43	39

a) $y = 0.680x + 9.013$
b) The slope is 0.680. It represents the average weight gain in pounds per month
c)  
d) 20 pounds

$m = -\frac{2}{3}$ $y = -1$

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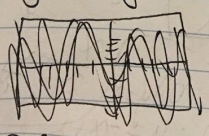
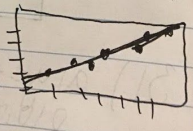
c)  
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