INTERMEDIATE ALGEBRA

GPS #6 **2.1 FUNCTIONS AND THEIR REPRESENTATIONS** **NAME:** Parul Patel

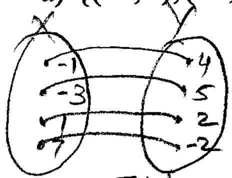
18/20 Good Job.

Useful Definitions:

* A relation is a set of ordered pairs. For example: $\{(-1,4),(-3,5),(1,2),(7,-2)\}$
* A function is a relation in which, for each value of the first component of the ordered pairs, there is exactly one value of the second component.
* In a relation, the set of all values of the independent variable is the domain; the set of all values of the dependent variable is the range.
* Vertical Line Test: If every vertical line intersects the graph of a relation only once, the relation is a function.

1. State whether each relation defines a function and give the domain and range.

a) $\{(-1,4),(-3,5),(1,2),(7,-2)\}$

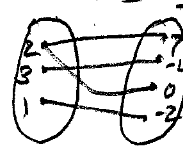


D: {-1, -3, 1, 7}
R: {4, 5, 2, -2}

It's a function

b) $\{(2,7),(3,-4),(2,0),(1,-2)\}$

It's not a function

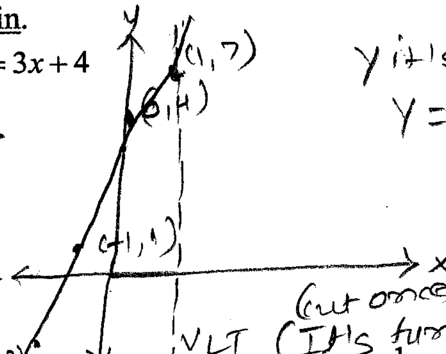


D: {2, 3, 1}
R: {7, -4, 0, -2}

2. Use "vertical line test" to check whether each relation defines y as a function of x. Give the domain.

a) $y = 3x + 4$

x	y
0	4
1	7
-1	1
-2	-2



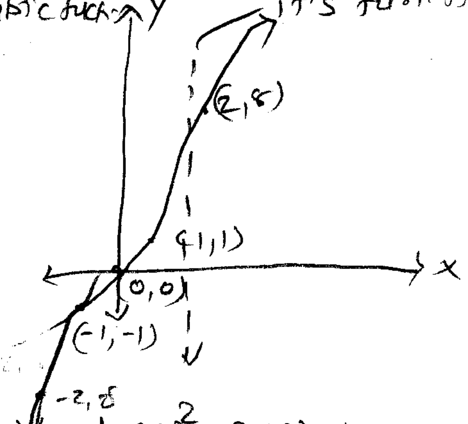
y it's f of x
Y = f(x)

b) $y = x^3$

cubic function

it's function

x	y
0	0
1	1
-1	-1
2	8
-2	-8



3. Let $f(x) = -2x+3$ and $g(x) = -\frac{1}{4}x^2 + 3x + 1$. Find the following.

function of x

a) $f(1) =$ $-2(1)+3 = 1$

x = 1

b) $g(-2) =$ $-\frac{1}{4}(-2)^2 + 3(-2)+1$
$= -\frac{1}{4}\cdot 4 - 6 + 1 = -6$

c) $f(m) =$ $-2m+3$

d) $g(-x) =$ $-\frac{1}{4}(-x)^2 + 3(-x) + 1$
$-\frac{1}{4}x^2 - 3x + 1$

e) $f(x+1) =$
$= -2(x+1)+3$
$= -2x - 2 + 3 = -2x+1$

e) $g(-k) =$
$= -\frac{1}{4}(-k)^2 + 3(-k)+1$
$= -\frac{1}{4}k^2 - 3k + 1$

4. For each function, find $f(1)$ and $f(-2)$.

a) $f = \{(-2,4),(3,6),(1,0),(7,2)\}$

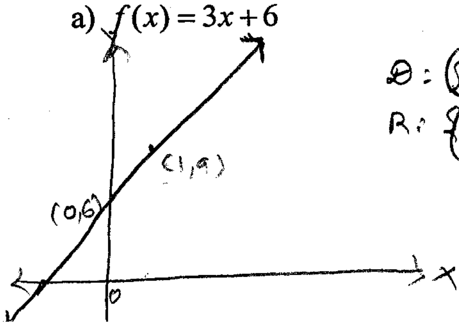
f(1) = 0
f(-2) = 4

b) $f = \{(1,2),(-3,0),(-2,9),(4,2)\}$

f(1) = 2
f(-2) = 9

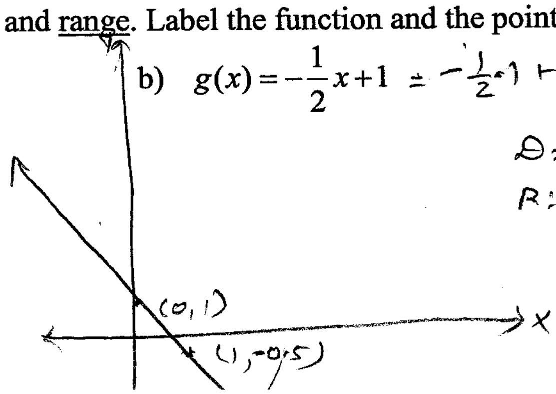
5. Graph each linear function. Give the domain and range. Label the function and the points.

a) $f(x) = 3x + 6$



D: {-∞, ∞}
R: {-∞, ∞}

b) $g(x) = -\frac{1}{2}x + 1$ $= -\frac{1}{2}\cdot 1 + 1 = (-0.5)$



D: {-∞, ∞}
R: {(∞, ∞)}

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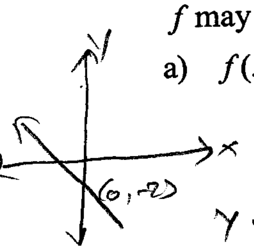
GPS # 7 2.2 LINEAR FUNCTIONS NAME: Parul Patel

Useful Guidelines:

* Linear Function: $f(x) = ax + b$ [Example: $f(x) = 4x - 3$, $a = 4$ and $b = -3$]
  Its graph is a straight line. For each unit increase in x, $f(x)$ changes by an amount equal to a.
* Rate of Change for a Linear Function: The output of a linear function changes by a constant amount for each unit increase in the input.
* When data have a constant rate of change, they can be modeled by $f(x) = ax + b$.
  The constant a represents the rate of change, and the constant b represents the initial amount or the value when $x = 0$.

1. Determine whether f is a linear function. If f is linear, give values for a and b so that f may be expressed as $f(x) = ax + b$.



a) $f(x) = -3x - 2$

It is function
line pass throy (0,-2)
yes it is because power (1) to x.

b) $f(x) = x^2 - 2$ ← Not linear funct. Power is > 1.

c) $f(x) = 50$

if. a=0 b=50 yes it is linear function

d) $f(x) = \sqrt{x} + 4$ $= x^{\frac{1}{2}} + 4$

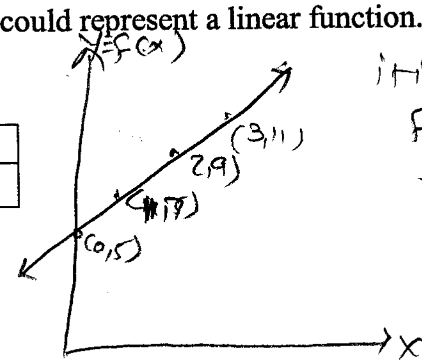
– it is not linear function

2. Use the table to determine whether $f(x)$ could represent a linear function. If it could, write the formula for f in the form $f(x) = ax + b$.

a)

x	0	1	2	3
$f(x)$	5	7	9	11

$\boxed{\text{formula}(x) = 2x+5}$



its linear function

Fx = ax+b
5 = 0 + b
$\boxed{b=5}$

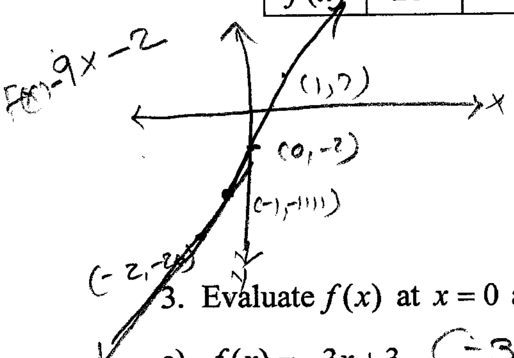
Fx = ax+5
7 = a(1)+5)
7 = a +5
a = 7 -5 $\boxed{a=2}$

b)

x	-2	-1	0	1
$f(x)$	-20	-11	-2	7

a=9

it's linear function



F(x)=9x −2

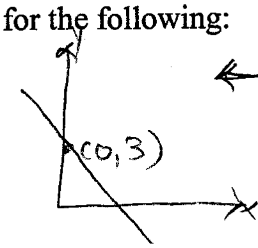
Fx = ax+b
-2 = 0+b
$\boxed{b = -2}$

Fx = ax+b
7 = a−2
$\boxed{a=9}$

3. Evaluate $f(x)$ at $x = 0$ and $x = -3$ for the following:

a) $f(x) = -3x + 3$ (−3x +3)

F(0) = 3
F(−3) = (−3)(−3)+3
9+3
$\boxed{12}$



b) $f(x) = -\frac{1}{3}x + 3$

F(0) = 3
f(-3) $-\frac{1}{3} \cdot (-3) + 3$

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GPS # 8 **2.3 THE SLOPE OF A LINE** **NAME:** Parul Patel

w/rw Good J.W.

Useful Guidelines:

* The slope of a line through the points (x_1, y_1) and (x_2, y_2) is

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{rise}{run}$ $(x_1 \neq x_2)$. **"Slope Formula"**

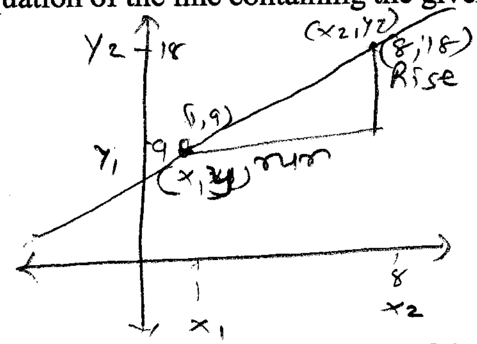
* The slope-intercept form of the equation of a line with slope m and y-intercept b is
  $y = mx + b$

1. Graph and find the slope of a line through the points $(1,9)$ and $(8,18)$. Label all the points. Find an equation of the line containing the given pair of points.

when only 1 fix Point formula

$m = \frac{y - y_1}{x - x_1}$

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



Slop formula

$\boxed{m = \frac{Rise}{Run} = \frac{y_2 - y_1}{x_2 - x_1}}$

$= \frac{18-9}{8-1}$

$= \frac{9}{7}$

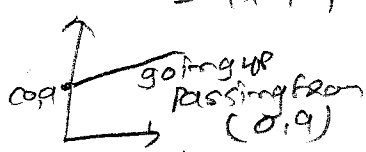
2. Find the equation in slope-intercept form of the line satisfying the given conditions.

in slop form $y = mx + b$

a) slope 4; y-intercept $(0,9)$ Slop $m = 4$ $b = 9$

$y = mx + b$

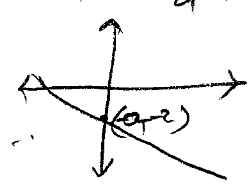
$= 4x + 9$



b) slope $-\frac{7}{4}$; y-intercept $(0,-2)$

$m = -\frac{7}{4}$ $b = -2$

$y = -\frac{7}{4}x - 2$



3. For each equation, write it in slope-intercept form, give the slope of the line, give the y-intercept, and graph the line. Label the line and all the points.

a) $-x + 2y = 8$

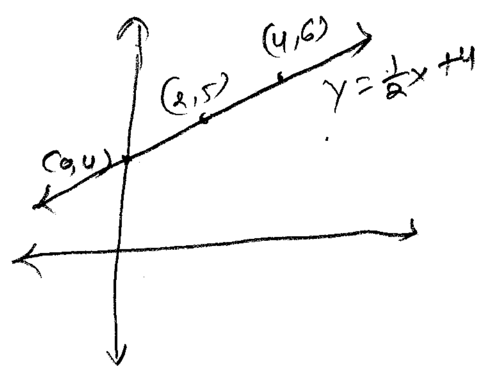
$2y = 8 + x$

$2y = x + 8$

$y = \frac{x}{2} + \frac{8}{2}$

$y = \boxed{\frac{1}{2}}x + 4$

$m = \frac{1}{2}$ y int: $(0,4)$



x	y
0	4
2	5
4	6

b) $3y + 6x = -12$

$3y = -12 - 6x$

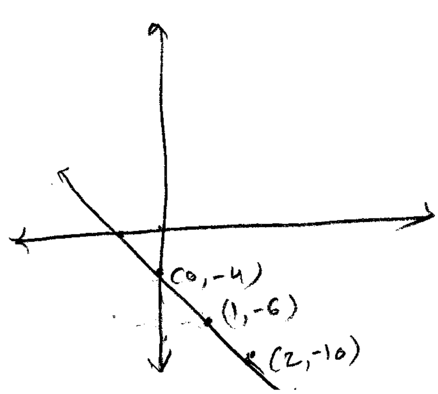
$3y = -6x - 12$

$y = -\frac{6x}{3} - \frac{12}{3}$

$y = -2x - 4$

$\boxed{m = -2}$

y int: $(0,-4)$



x	y
0	-4
1	-6
2	-10

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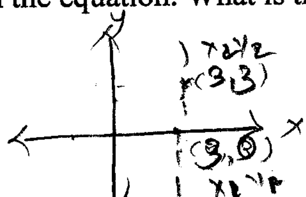
GPS # 9 **2.4 EQUATIONS OF LINES AND LINEAR MODELS** **NAME:** Parul Patel

W/ps Good Job.

Useful Guidelines:
* The slope-intercept form of the equation of a line with slope m and y-intercept b is $y = mx + b$
* The point-slope form of the equation of a line with slope m passing through the point (x_1, y_1) is $y - y_1 = m(x - x_1)$
* The standard form of the equation of a line: $ax + by = c$
* Two lines with the same slope are parallel: $m_1 = m_2$
* Two lines with nonzero slopes m_1 and m_2 are perpendicular when $m_1 \cdot m_2 = -1$ or $m_2 = -\dfrac{1}{m_1}$.

1. Graph the equation. What is the slope?

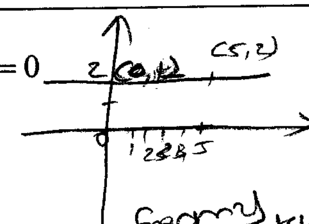
a) $x = 3$



$\dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{3 - 0}{3 - 3} = \dfrac{3}{0}$

$\boxed{\text{und fine because cant devide by 0}}$

b) $y - 2 = 0$



$= \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{2 - 2}{5 - 1} = \dfrac{0}{4}$ $\boxed{= 0}$ $\boxed{\text{No slo}}$

horizontal line

2. Does the point (2,48) lie on the line $y = 20x + 8$?

$x = 2$ $y = 20(2) + 8 = 48$

Yes it's on line.

3. Using the point-slope form to find an equation of the line that satisfies the given conditions. Write the equation in slope-intercept form and in standard form. — Bring x & y together & numb

a) Through (6, 1); slope $-\dfrac{1}{3}$ $m = -\frac{1}{3}$

(x_1, y_1) $(6, 1)$

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

$y - 1 = -\frac{1}{3}(x - 6)$

$y - 1 = -\frac{1}{3}x + 2$

$\boxed{y = -\frac{1}{3}x + 3}$ slop int for

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

$3y + 3x\frac{1}{3} = 3 \cdot 3$

$\boxed{3y + x = 9}$ Std form

b) Through (-3,-2); slope $-\dfrac{4}{3}$ (m) (x_1, y_1)

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

$y + 2 = -\frac{4}{3}(x + 3)$

$y + 2 = -\frac{4x}{3} - 4$

$y = -\frac{4x}{3} - 4 - 2$

slop int form $\boxed{y = -\frac{4x}{3} - 6}$

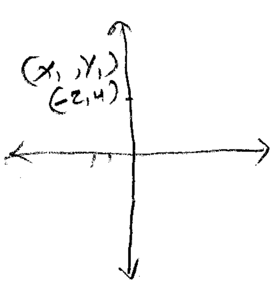
$y + \frac{4x}{3} = -6$

$\boxed{3y + 4x = -18}$ Std form

3. Find an equation of the line passing through the point (-2, 4) and

a) parallel to the line $3x + 5y = 10$

[Write each equation in slope-intercept form.]



$5y = -3x + 10$

$y = \frac{-3}{5}x + 2$

$m_1 = -\frac{3}{5}$

$m_2 = m_1$ (Parallel line)

$\boxed{m_2 = -\frac{3}{5}}$

one Point slop fm

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

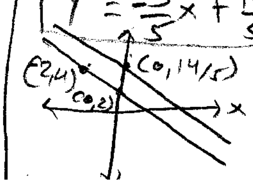
$y - 4 = -\frac{3}{5}(x + 2)$

$y - 4 = -\frac{3}{5}x - \frac{6}{5}$

$y = -\frac{3}{5}x - \frac{6}{5} + 4 \cdot \frac{5}{5}$

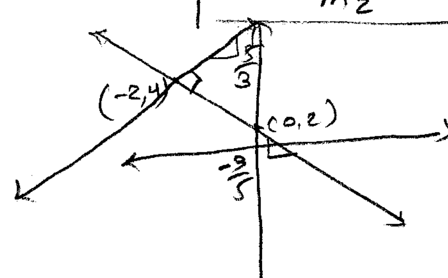
$y = -\frac{3}{5}x - \frac{6}{5} + \frac{20}{5}$

$\boxed{y = -\frac{3}{5}x + \frac{14}{5}}$



b) perpendicular to the line $3x + 5y = 10$

$\boxed{m_1 = \frac{-1}{m_2} = \frac{5}{3}}$



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

$y - 4 = \frac{5}{3}(x + 2)$

$y - 4 = \frac{5x}{3} + \frac{10}{3}$

$y = \frac{5x}{3} + \frac{10}{3} + 4 \cdot \frac{3}{3}$

$\boxed{y = \frac{5x}{3} + \frac{22}{3}}$