

### Test 4: Sequences and Linear Functions Version B

Name: \_\_\_\_\_

1. (2 points) An arithmetic sequence begins with 8 and has a common difference of 5. What is the 72<sup>nd</sup> term?

$$a_1 = 8 \quad d = 5$$

$$\begin{aligned} a_{72} &= a_1 + (n-1)d \\ &= 8 + 71(5) \end{aligned}$$

$$= 363$$

2. (3 points) The 45<sup>th</sup> term of an arithmetic sequence is 203. The 53<sup>rd</sup> term is 167. What is the first term?

$$a_{45} = 203 \quad a_{53} = 167$$

$$b_0 = 203 \quad b_8 = 167$$

$$\frac{167 - 203}{8 - 0} = -4.5 = d$$

$$a_n = a_1 + (n-1)d$$

$$203 = a_1 + (45-1)(-4.5)$$

$$a_1 = 401$$

3. (2 points) Consider the following pattern. Write an equation for the number of stars in figure  $n$ .

$$a_1 = 1 \quad d = 5$$



Figure 1



Figure 2



Figure 3

let  $n$  be the figure #  
 $S_n$  is # of stars in figure  $n$

$$S_n = 1 + (n-1)5$$

$$= 5n - 4$$

4. (a) (2 points) Give two definitions of "slope".

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

$$\frac{\Delta y}{\Delta x}$$

$$\frac{y_2 - y_1}{x_2 - x_1}$$

The constant  
 amount  
 added in  
 the sequence

(b) (1 point) Use one of your definitions to explain why a vertical line has an undefined slope.

Vertical has  $\text{run} = 0 = \Delta x$

$\frac{\text{rise}}{0}$  which is undefined

5. (2 points) Line 1 is defined by  $3x - 2y = 6$  and line 2 is perpendicular to  $y = -\frac{1}{2}x + 4$ . Which line has a largest rate of growth?

Line 1  $3x - 2y = 6$

$$2y = 3x + \dots$$

$$y = \frac{3}{2}x + \dots$$

Line 2  
vs  $y = 2x + \dots$

$$2 > \frac{3}{2}$$

so Line 2

6. (3 points) Determine the value of  $x$  such that the line that passes through the points  $(x, 3)$  and  $(2, 7)$  is parallel to the line segment that has a  $y$ -intercept of 4 and  $x$ -intercept of  $-8$ .

$(0, 4)$  and  $(-8, 0)$   $m = \frac{\Delta y}{\Delta x} = \frac{4 - 0}{0 + 8} = \frac{1}{2}$

$$\frac{1}{2} = \frac{\Delta y}{\Delta x} = \frac{3 - 7}{x - 2}$$

$$x - 2 = -8$$

$$\boxed{x = -6}$$

7. Determine the equation of the line that

(a) (2 points) Passes through the points (3, 5) and (7, -3).

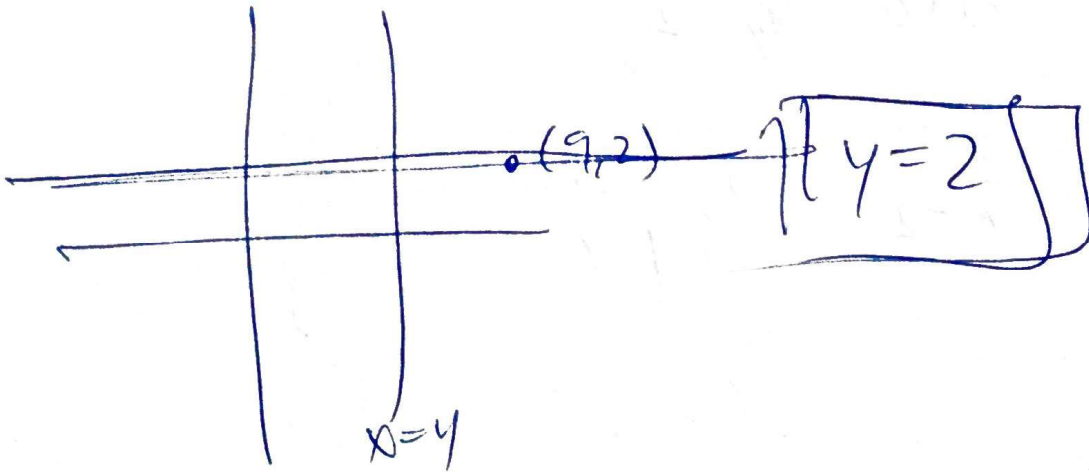
$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{5 - (-3)}{3 - 7} = \frac{8}{-4} = -2$$

$$y - 5 = -2(x - 3)$$

$$y = -2x + 11$$

$$2x + y - 11 = 0$$

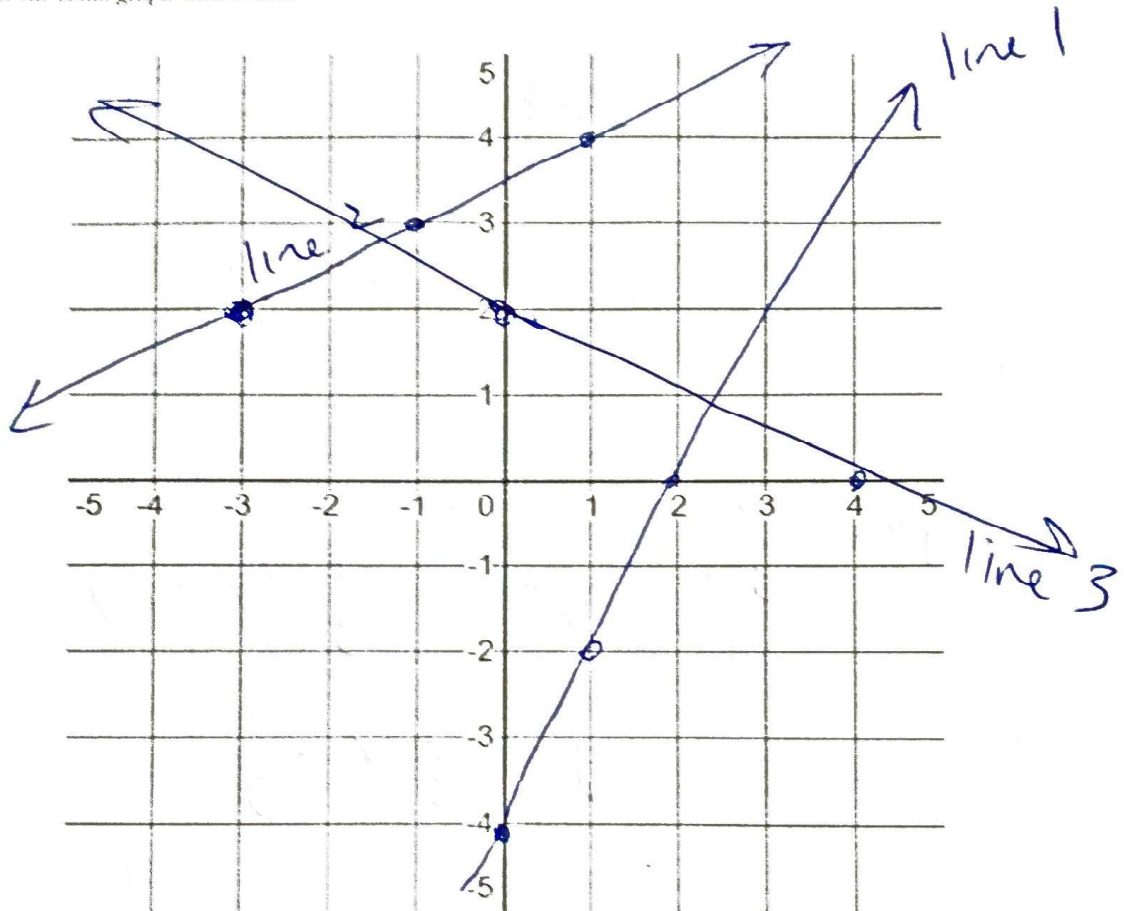
(b) (1 point) Passes through the point (9, 2) and is perpendicular to the line  $x = 4$ .



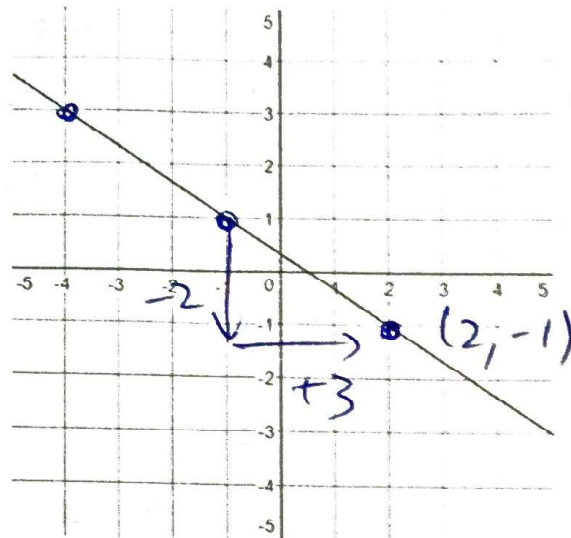
8. Graph the following lines

$$\begin{aligned}y &= 2x - 4 && \text{line 1} \\y - 2 &= 0.5(x + 3) && \text{line 2} \\2x + 4y &= 8 && \text{line 3}\end{aligned}$$

on the same graph with a label



9. Consider the following graph



(a) (2 points) Write the equation of the line in either slope-intercept form OR point-slope form.

$$\text{slope} = \frac{-2}{3}$$

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

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

(b) (2 points) Write the equation of the line in general form.

$$2x + 3y - 1 = 0$$

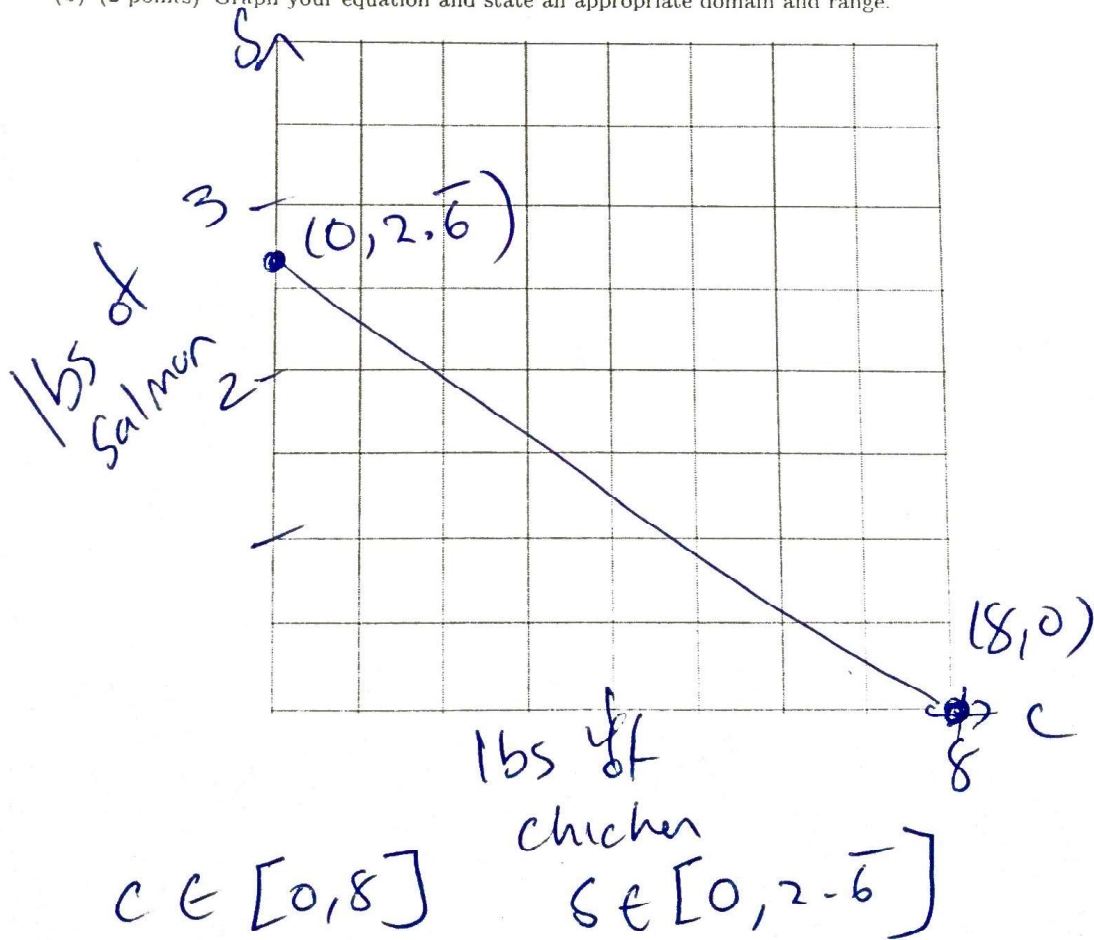
10. Suppose you go grocery shopping and budget \$40 for proteins. Chicken costs \$5 per pound and salmon is \$12 per pound.

(a) (2 points) Write an equation you could use to determine the amount of chicken and salmon to buy.

let  $c$  be lbs of chicken and  $s$  be lbs of salmon

$$40 = 5c + 12s$$

(b) (2 points) Graph your equation and state an appropriate domain and range.



11. (1 point (bonus)) Show that slope-intercept form is the same as point-slope form.

$$y = mx + b \quad \text{vs} \quad y - y_1 = m(x - x_1)$$

→ that gives you the point  $(0, b)$

$$y - b = m(x - 0)$$