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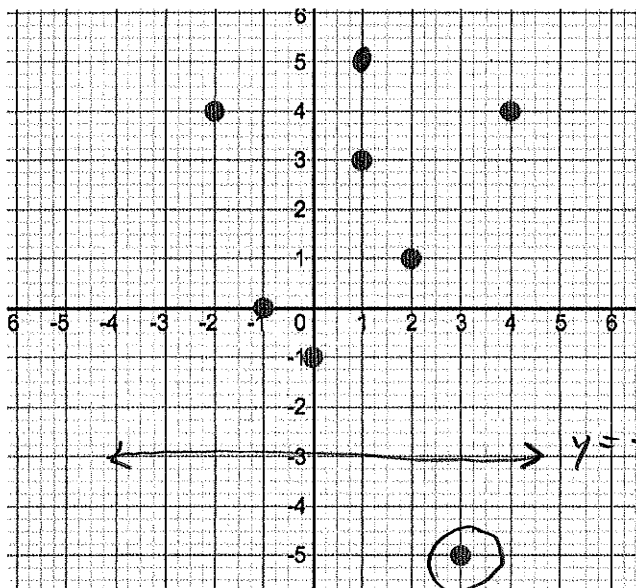
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IM 3 Quiz 1.1 - Function Basics

Teacher: Mr. Santowski and Mr. Smith

Score: _____

1. Here is a graph of a relation (defined by a scatter plot).



$R: \{-5, -1, 0, 1, 3, 4\}$. **(7 marks)**

a. State domain and range of this relation.

(2M)

$D: \{-2, -1, 0, 1, 2, 3, 4\}$ OR

$D: \{x \in \mathbb{Z} \mid -2 \leq x \leq 4\}$

b. Evaluate $f(2)$

(1M)

1

c. Solve $f(x) = 4$ for x .

(1M)

$x = -2$

$x = 4$

d. What does $f(3) = -5$ mean, given this graphic representation?

(1M)

it means that $(3, -5)$ is a point on the graph

e. Ms. A would like to make changes to this graph, such that this graph now shows a relation that is NOT a function. Provide ONE change that Ms. A could make to this graph and explain why the NEW graph now shows a non-function.

(2M)

-any point/line/curve such that one x input value has multiple outputs
ex add point $(1, 5)$
or add line $y = -3$

2. In this question, you will work with algebraic representations of functions, specifically the linear function $f(x) = \frac{3}{4}x + 2$ and the quadratic function $g(x) = -2(x+3)^2 - 1$.

(11 marks)

Working with the **linear** function, $f(x) = \frac{3}{4}x + 2$:

- a. State the domain and range of $f(x) = \frac{3}{4}x + 2$

(2M)

$$D: \{x \in \mathbb{R}\}$$

$$R: \{y \in \mathbb{R}\}$$

- c. Evaluate $f(B+1)$. Simplify your final answer.

$$\begin{aligned} f(B+1) &= \frac{3}{4}(B+1) + 2 && \text{(1M)} \\ &= \frac{3}{4}B + \frac{3}{4} + 2 = \frac{3}{4}B + \frac{11}{4} \end{aligned}$$

- b. Evaluate $f(8)$

(2M)

$$\begin{aligned} f(8) &= \frac{3}{4}(8) + 2 \\ &= 6 + 2 \\ &= 8 \end{aligned}$$

- d. Solve $f(x) = -14$ for x .

(2M)

$$\begin{aligned} -14 &= \frac{3}{4}x + 2 \\ -16 &= \frac{3}{4}x \\ \frac{-16}{3/4} &= x \end{aligned}$$

Now, working with the **quadratic** function, $g(x) = -2(x+3)^2 - 1$:

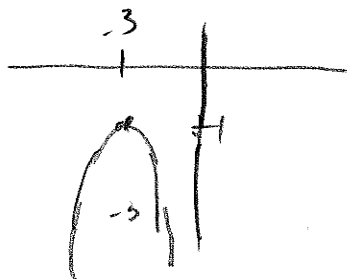
- e. State the domain and range of

$$g(x) = -2(x+3)^2 - 1$$

(2M)

$$D: \{x \in \mathbb{R}\}$$

$$R: \{y \in \mathbb{R} \mid y \leq -1\}$$



- f. Evaluate $g(5)$

(2M)

$$\begin{aligned} g(5) &= -2(5+3)^2 - 1 \\ &= -2(8)^2 - 1 \\ &= -2(64) - 1 \\ &= -128 - 1 \\ &= -129 \end{aligned}$$



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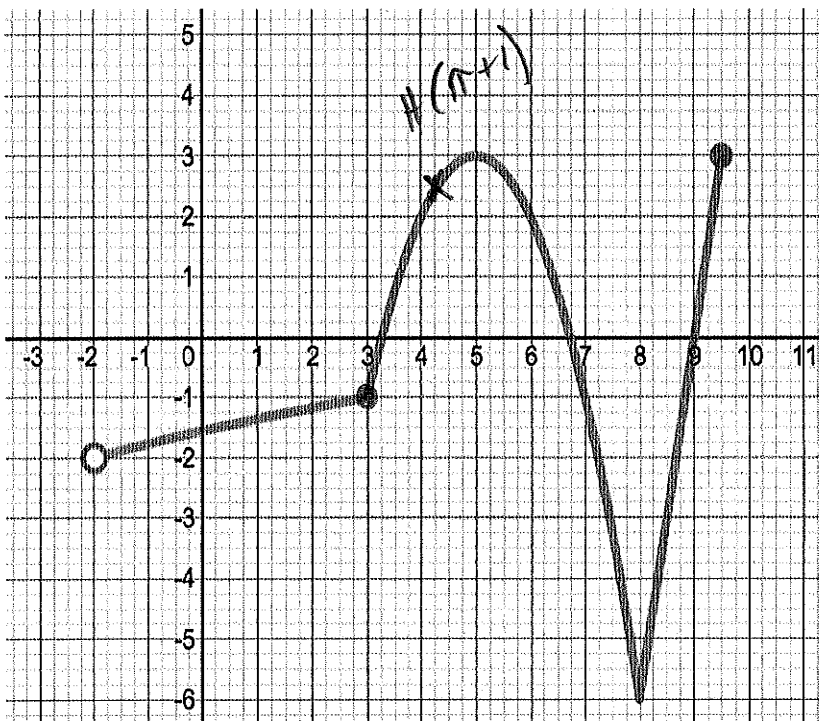
IM 3 Quiz 1.1 - Function Basics

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3. The following function concept questions are based upon a graphic representation of functions. I have provide you with a graph of a function, $y = H(x)$.

(10 marks)



- a. State the domain of $y = H(x)$. Use proper notation (or use words if you need to).

$$D: \{x \in \mathbb{R} \mid -2 < x \leq 9.5\} \quad (2M)$$

$$R: \{y \in \mathbb{R} \mid -6 \leq y \leq 3\}$$

- b. Find $H(3)$.

-1

(1M)

- c. Is $H(1+\pi)$ positive or negative. Explain how you determined your answer.

$H(4.14)$ is positive because the curve ^{point} is above the x-axis **(2M)**

- d. For what values of x is $H(x) = -1$?

$$x = 3, 7 \text{ and } 8\frac{3}{4}$$

- e. What is the graphical significance of $H(x) = 0$?

x-intercepts or zeroes **(1M)**

- f. For what values of x is $H(x) < 0$?

(2M)

$H(x) < 0$ on the x values of

below x-axis

(1) $\{x \in \mathbb{R} \mid -2 < x < 3\frac{1}{4}\}$ or

(2) $\{x \in \mathbb{R} \mid 6\frac{3}{4} < x < 9\}$



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4. In this question, you will work with the linear functions and their graphs.

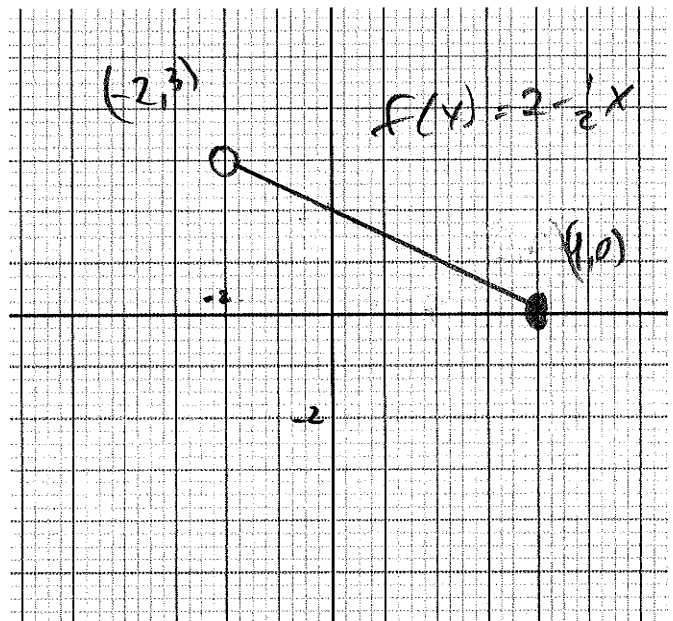
(9 marks)

- a. Graph the function $f(x) = 2 - \frac{1}{2}x$, given the restricted domain of $\{x \in \mathbb{R} \mid -2 < x \leq 4\}$ or $(-2, 4]$.

(3M) $f(-2) = 2 - \frac{1}{2}(-2) = 2 + 1 = 3$
 $f(4) = 2 - \frac{1}{2}(4) = 2 - 2 = 0$

- b. Since the domain is restricted, so must be the range. State the range of $f(x)$. Use proper notation.

(2M) $\{y \in \mathbb{R} \mid 0 \leq y < 3\}$

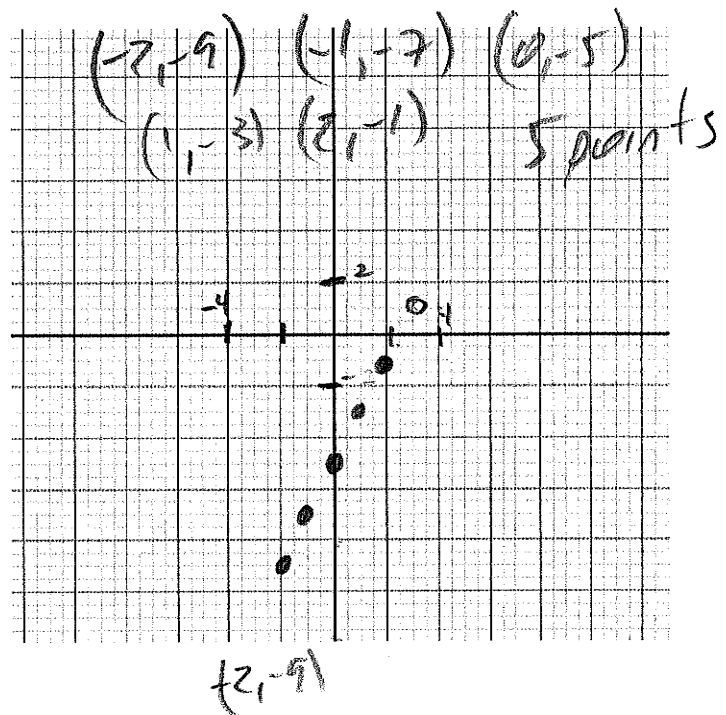


- c. Now work with the linear function $g(x) = 2x - 5$. Graph this linear function given the restricted domain of $\{x \in \mathbb{Z} \mid -2 \leq x < 3\}$.

(3M) $g(-2) = 2(-2) - 5 = -9$
 $g(3) = 2(3) - 5 = 1$
 $g(2) = 2(2) - 5 = -1$

- d. Since the domain is restricted, so must be the range. State the range of $g(x)$.

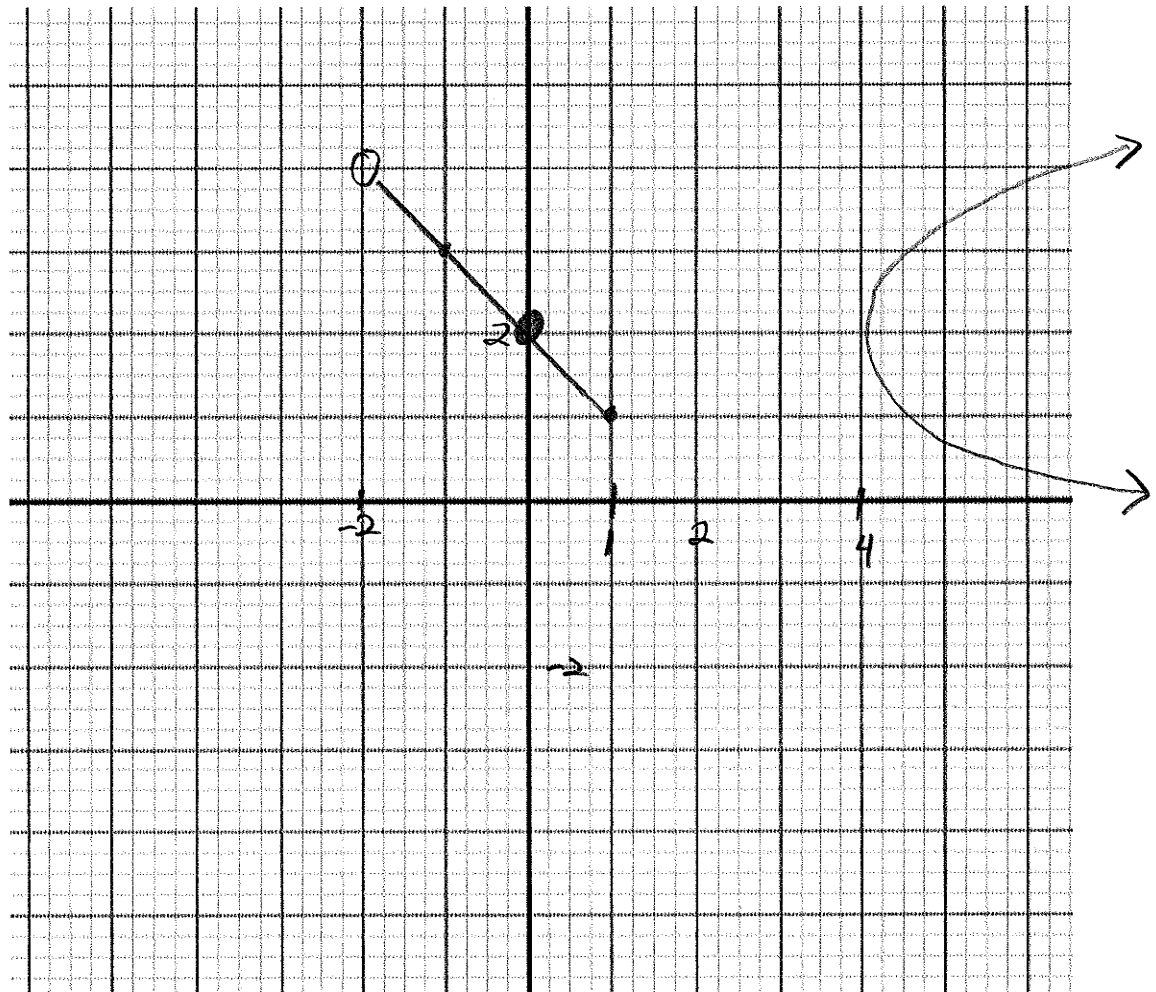
(1M) $R: \{-9, -7, -5, -3, -1\}$



5. In this question, you will produce a graph of a **relation** that meets the following criteria:

(5 marks)

- a. The y-intercept is 2 **(1M)**
- b. The range is $\{y \in \mathbb{R} \mid y > 0\}$ **(1M)** *→ only above x-axis*
- c. The domain is $\{x \in \mathbb{R} \mid -2 < x \leq 1 \cup x > 4\}$ **(2M)** *between -2, 1 more than 4*
- d. The relation is NOT a function. **(1M)**



one example