

INVERSE INVESTIGATION ASSIGNMENT

Q1. $f(x) = 3x + 2$

$$g(x) = \frac{x - 2}{3}$$

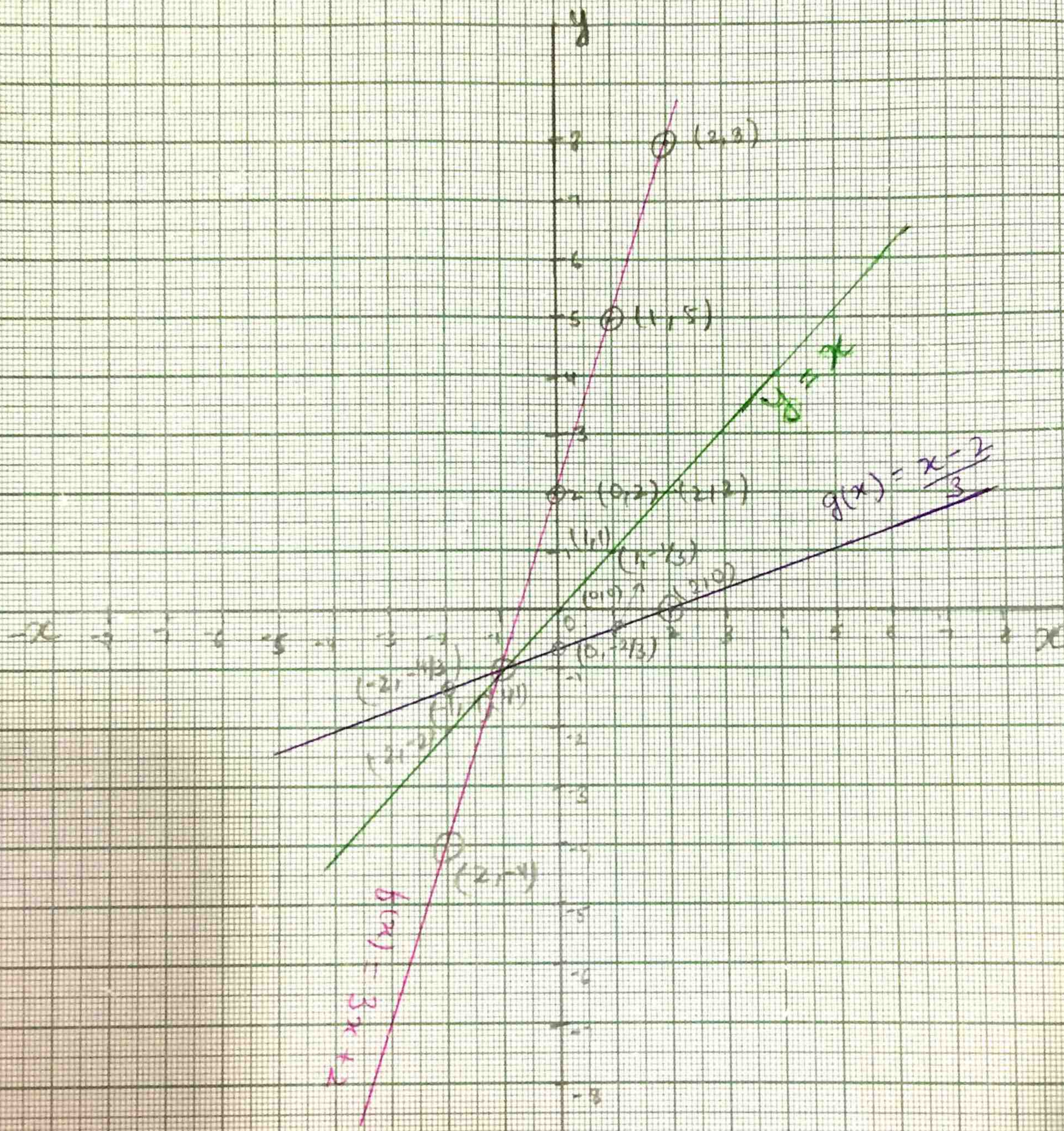
x	y
0	2
1	5
-1	-1
2	8
-2	-4

x	y
0	$-\frac{2}{3}$
1	$-\frac{1}{3}$
-1	-1
2	0
-2	$-\frac{4}{3}$

$$y = x$$

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

→ graph attached.



-y

Q2.

$$\text{Given } f(x) = 3x + 2$$

$$\text{Domain} = (-\infty, \infty) \{x | x \in \mathbb{R}\}$$

$$\text{Range} = (-\infty, \infty) \{y | y \in \mathbb{R}\}$$

$$\text{For } g(x) = \frac{x - 2}{3}$$

$$\text{Domain} = (-\infty, \infty) \{x | x \in \mathbb{R}\}$$

$$\text{Range} = (-\infty, \infty) \{y | y \in \mathbb{R}\}$$

Relationship between the Domain of $g(x)$ and Range of $f(x)$ - Yes, the domain of $g(x)$ and range of $f(x)$ are both similar and belongs to real numbers.



Q4 For $f(x)$ and $g(x)$ w.r.t graph.

Similarities.	Differences.
<p>① Both are real numbers</p> <p>② Domain of $f(x)$ and $g(x)$ are similar i.e $(-\infty, \infty)$</p> <p>③ Range of $f(x)$ and $g(x)$ are also similar i.e $(-\infty, \infty)$.</p>	<p>① The graph of $f(x)$ and $g(x)$ are not similar.</p> <p>② The range of $f(x)$ is larger than $g(x)$.</p>

Q5. For $f(x)$ and $g(x)$ w.r.t table.

Similarities	Differences.
<p>① For the value of $x = -1$ the value of y is same</p> <p>② Both are straight line.</p>	<p>① The range of $f(x)$ is extended than that of $g(x)$.</p> <p>② The graph of $f(x)$ lie on the positive and negative side of y, while that of $g(x)$ lie on the negative side of y.</p>

Q.5. Referring to the graph of Question No. 1 $f(x)$ and $g(x)$ are mirror images of each other with $y = x$ as mirror.

Q.6. For $f(x)$ intercept on x axis = 0.7 and intercept on y axis = 2.

For $g(x)$ intercept on x axis = 2
intercept on y axis = -0.7.

Characteristics - $f(x)$ and $g(x)$ are inverse functions of each other.

Q.7. Slope of $f(x) = \frac{2}{-0.7}$

Slope of $g(x) = \frac{-0.7}{2}$

Characteristics - Product of slope of $f(x)$ and $g(x)$ is = 1.

Q8.

$$y = 3x + 2$$

$$x = 3y + 2$$

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

$$f^{-1}(x) = \frac{x-2}{3}$$

This result is similar to $g(x)$.

Q9. $y = x^2$

x	y
0	0
1	1
2	4

$$y = \sqrt{x}$$

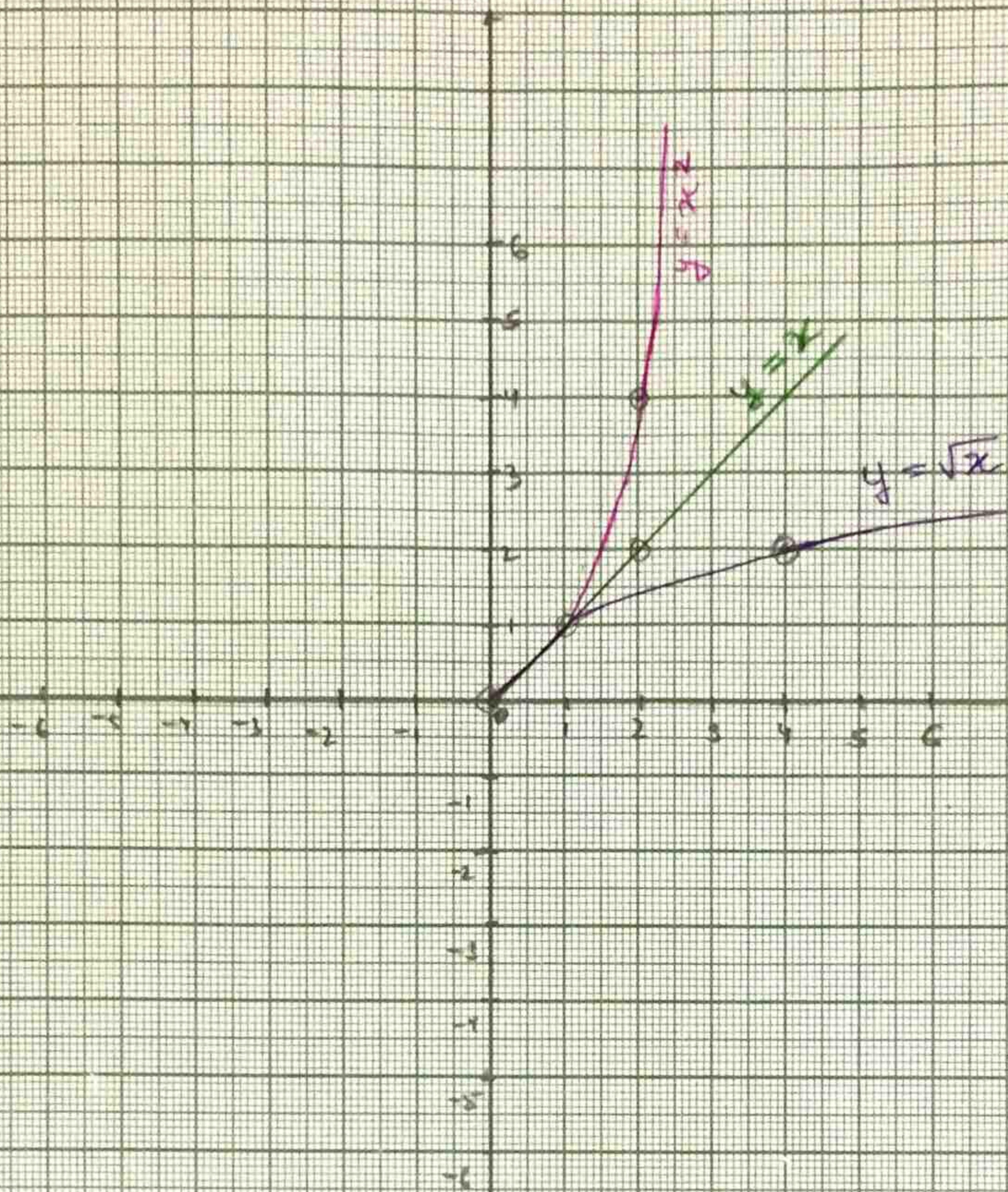
x	y
0	0
1	1
4	2

$$y = x$$

x	y
0	0
1	1
2	2

* graph attached.

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Q10. Main ideas regarding question 2-8, for the graphs drawn in step 9.

- ① Find the value of y for given x under given relation
- ② Draw the table for different value of x and corresponding y .
- ③ Study of similarities and differences between two given relations.
- ④ Plot the graph with the help of table
- ⑤ To find intercepts of the function on graph.
- ⑥ To find the slope of the curve.
- ⑦ To find the relation between the functions like inverse, mirror image.

Q.11.

$$y = x^2$$

$$\Rightarrow x = y^2$$

$$\Rightarrow y = \pm \sqrt{x}$$

NO, $y = \sqrt{x}$ is not the inverse of
 $y = x^2$.

The inverse of $y = x^2$ is,

$$f^{-1}(x) = \pm \sqrt{x}.$$

The inverse of $y = x^2$ is not a function
as it has two values with + and -
signs.

Q12. Properties of the inverse functions

- The domain of the inverse functions is the same as the range of the original function.
- The graph of $y = f^{-1}(x)$ is the reflection of $y = f(x)$ in the line $y = x$.
- If the graphs of $y = f(x)$ and $y = x$ intersect at one or more points, then the graph of $y = f^{-1}(x)$ will intersect the graph of $y = x$ at the same points.
- The inverse of a function may or may not be a function.
- The slope of $f^{-1}(x)$ is the reciprocal of the slope of $f(x)$.
- The x intercepts of $f(x)$ are the same as the y -intercept of $f^{-1}(x)$. The y -intercept of $f(x)$ is the same as the x intercept of $f^{-1}(x)$.