1. Which of the following points in the Cartesian Plane is on the y-axis? **1 / 1 point**

- ○ $(1, 1)$
- ○ $(5, 0)$
- ◉ $(0, -5)$
- ○ $(-5, 0)$

Correct
The y-axis is defined to be all points in the Cartesian plane with zero as x-coordinate. The point $(0, -5)$ meets that requirement.

2. Find the distance between the points $A = (2, 2)$ and $C = (3, 3)$: **1 / 1 point**

- ◉ $\sqrt{2}$
- ○ 2
- ○ 1
- ○ 0

Correct
Recall that the distance between points (a, b) and (c, d) is $\sqrt{(c-a)^2 + (d-b)^2}$.

In this case $(a, b) = (2, 2)$ and $(c, d) = (3, 3)$, so the distance is $\sqrt{(3-2)^2 + (3-2)^2} = \sqrt{2}$.

3. Find the point-slope form of the equation of the line that goes between $A = (1, 1)$ and $B = (5, 3)$: **1 / 1 point**

- $y - 3 = \frac{1}{2}(x - 1)$
- **(selected)** $y - 1 = \frac{1}{2}(x - 1)$
- $y = \frac{1}{2}x$
- $y - 1 = \frac{1}{2}(x - 5)$

Correct

The point-slope form for the equation of a line with slope m that goes through the point (x_0, y_0) is $y - y_0 = m(x - x_0)$

In this case, the slope $m = \frac{3-1}{5-1} = \frac{1}{2}$

We can choose either A or B for the point on the line, but in neither case do we get this chosen answer.

4. Which of the following points is on the line with equation: **1 / 1 point**

$y - 1 = 2(x - 2)$?

- **(selected)** $(2, 1)$
- $(0, 0)$
- $(3, 2)$
- $(2, 3)$

Correct

If we plug in 1 for y and 2 for x in the equation of the line, we make a true statement, $0 = 0$, so this point lies on the line.

5. Suppose that a line ℓ has slope 2 and goes through the point $(-1, 0)$. What is the y-intercept of ℓ? **1 / 1 point**

- ○ 0
- ○ -1
- ◉ 2
- ○ 1

Correct
Recall that the y-intercept of ℓ is the y-coordinate of where ℓ hits the y-axis.

Since $(-1, 0) \in \ell$, the point on ℓ with $x = 0$ is obtained by running one unit from $(-1, 0)$ while rising two units.

This gives $y = 2$ as the y-intercept.

1. Suppose that $A = \{1, 2, 10\}$ and $B = \{4, 8, 40\}$. Which of the following formulae do ***not*** define a function $f : A \to B$? **1 / 1 point**

- ◉ $f(1) = 5, f(2) = 8$, and $f(10) = 40$.
- ○ $f(a) = 4a$, for each $a \in A$
- ○ $f(1) = 4, f(2) = 40$, and $f(10) = 8$.
- ○ $f(1) = 4, f(2) = 4$, and $f(10) = 4$.

Correct
A function $f : A \to B$ is a rule which assigns an element $f(a) \in B$ to each $a \in A$. In this case, unfortunately, $f(1) = 5 \notin B$.

2. Suppose that A contains every person in the VBS study (see the second video in the course if you're confused here!). Suppose that $Y = \{+, -\}$ and $Z = \{H, S\}$

1 / 1 point

Suppose that $T : A \to Y$ is the function which gives $T(a) = +$ if person a tests positive and $T(a) = -$ if they test negative.

Suppose that $D : A \to Z$ is the function which gives $D(a) = H$ does not actually have VBS and $D(a) = S$ if the person actually has VBS.

Which of the following must be true of person a if we have a false positive?

- (●) $T(a) = +$ and $D(a) = H$
- ( ) $T(a) = -$ and $D(a) = S$
- ( ) $T(a) = +$ and $D(a) = S$
- ( ) $T(a) = -$ and $D(a) = H$

Correct

Recall that a false positive is a positive test result (so $T(a) = +$) which is misleading because the person actually does not have the disease ($D(a) = H$)

3. Consider the function $g : \mathbb{R} \to \mathbb{R}$ defined by $g(x) = x^2 - 1$. Which of the following points are *not* on the graph of g? **1 / 1 point**

- ○ $(0, -1)$
- ○ $(-1, 0)$
- ○ $(1, 0)$
- ◉ $(2, -1)$

Correct
Recall that the graph of g consists of all points (x, y) such that $y = g(x)$. Here $g(2) = 3 \neq -1$, so the point $(2, -1)$ is \emph{not} on the graph of g.

4. Let the point $A = (2, 4)$. Which of the following graphs does *not* contain the point A? **1 / 1 point**

- ◉ The graph of $h(x) = x - 1$
- ○ The graph of $g(x) = x + 2$
- ○ The graph of $f(x) = 2x$
- ○ The graph of $s(x) = x^2$

Correct
The graph of h consists of all points (x, y) such that $y = h(x)$. Here $h(2) = 1 \neq 4$, so the point $(2, 4)$ is *not* on the graph of h.

5. Suppose that $h(x) = -3x + 4$. Which of the following statements is true? **1 / 1 point**

- ○ h is neither a strictly increasing function nor a strictly decreasing function.
- ○ h is a strictly increasing function
- ◉ h is a strictly decreasing function
- ○ All statements are correct

Correct
A function h is called strictly decreasing if whenever $a < b$, then $h(a) > h(b)$

Since the graph of h is a line with negative slope, this is in fact true!

6. Suppose that $f : \mathbb{R} \to \mathbb{R}$ is a strictly increasing function, with $f(3) = 15$ **1 / 1 point**

Which of the following is a possible value for $f(3.7)$?

- ○ 14.7
- ○ 3
- ○ -3
- ◉ 17

Correct
A function f is called strictly increasing if whenever $a < b$, then $f(a) < f(b)$.

Since $f(3) = 15$ is given and $3 < 3.7$, it must be that $15 < f(3.7)$, and this answer satisfies that.

1. Which of the following points in the Cartesian Plane have positive x-coordinate and negative y-coordinate? **1 / 1 point**

- ○ $(-4, 5)$
- ○ $(5, 7)$
- ◉ $(7, -1)$
- ○ $(0, 0)$

Correct
The x-coordinate, 7, is positive, and the y-coordinate, -1, is negative.

2. Which of the following points is in the first quadrant of the Cartesian Plane? **1 / 1 point**

- ○ $(5, -1)$
- ○ $(-4, -7)$
- ◉ $(7, 11)$
- ○ $(-5, 1)$

Correct
The first quadrant is defined to be all points in the Cartesian plane whose coordinates are both positive.

3. Let A, B, C, D be points in the Cartesian Plane, and let the set $S = \{B, C, D\}$ **1 / 1 point**

Suppose that the distances from A to B, C, D are $5.3, 2.1$, and 11.75, respectively.

Which of the following points is the nearest neighbor to the point A in the set S?

- ◉ C
- ○ A
- ○ D
- ○ B

Correct
The distance from A to C is 2.1 and that is smaller than the distance from A to any other element of S.

4. Find the distance between the points $A = (2, 2)$ and $B = (-1, -2)$. **1 / 1 point**

- ○ 25
- ○ -25
- ◉ 5
- ○ 1

Correct

Recall that the distance between points (a, b) and(c, d) is $\sqrt{(c-a)^2 + (d-b)^2}$

In this case we have:

$$\sqrt{(-1-2)^2 + (-2-2)^2} = \sqrt{(-3)^2 + (-4)^2} = \sqrt{25} = 5$$

6. Find the point-slope form of the equation of the line with slope -2 that goes through the point $(5, 4)$.

1 / 1 point

- $y - 4 = 2(x - 5)$
- $y - 5 = -2(x - 4)$
- $(5, 4)$
- $y - 4 = -2(x - 5)$

Correct

The point-slope form for the equation of a line with slope m that goes through the point (x_0, y_0) is $y - y_0 = m(x - x_0)$.

In this case, the slope $m = -2$ is given and the point $(5, 4)$ on the line is given.

7. Which of the following equations is for a line with the same slope as $y = -3x + 2$?

1 / 1 point

- $y = 5x + 2$
- $y = 5x$
- $y = 8x - 3$
- $y = -3x - 8$

Correct

The slope-intercept formula for a line is $y = mx + b$, where m is the slope and b is the y-coordinate of the point where the line hits the y-axis.

This line has slope $m = -3$ which is the same slope as the given line.

8. Which of the following equations is for a line with the same y-intercept as $y = -3x + 2$? **1 / 1 point**

- ○ $y = 8x - 3$
- ○ $y = -3x - 8$
- ○ $y = 5x$
- ◉ $y = 5x + 2$

Correct
The the slope-intercept formula for a line is $y = mx + b$, where m is the slope and b is the y-coordinate of the point where the line hits the y-axis. This line has a y-intercept of 2 which is the same as the given line.

9. How many lines contain both the point $A = (1, 1)$ and the point $B = (2, 2)$? **1 / 1 point**

- ○ infinitely many
- ○ None
- ◉ 1
- ○ 2

Correct
The line with equation $y = x$ is the one and only line that meets the stated requirements.

11. How many graphs contain both the point $A = (0, 0)$ and the point $B = (1, 1)$ **1 / 1 point**

- ○ None
- ○ 1
- ○ 2
- ◉ Infinitely many

Correct
The graphs of $f(x) = x, g(x) = x^2, h(x) = x^3, s(x) = x^4, \ldots$ all contain both A and B

12. Suppose that $g : \mathbb{R} \to \mathbb{R}$ is a continuous function whose graph intersects the x-axis more than once. Which of the following statements is true? **1 / 1 point**

- ◉ g is neither strictly increasing nor strictly decreasing.
- ○ g is strictly decreasing.
- ○ All of the above.
- ○ g is strictly increasing.

Correct
The function g fails the horizontal line test, so it can neither be strictly increasing nor strictly decreasing.

13. Find the slope of the line segment between the points $A = (1, 1)$ and $B = (5, 3)$. **1 / 1 point**

- ○ 4
- ○ 2
- ◉ $\frac{1}{2}$
- ○ $\sqrt{20}$

Correct
The slope of this line segment is $\frac{3-1}{5-1} = \frac{1}{2}$, where $3 - 1$ is the rise and $5 - 1$ is the run.

5. Find the slope of the line segment between the points $A = (0, 1)$ and $B = (1, 0)$. **1 / 1 point**

- (●) -1
- ( ) 1
- ( ) $\sqrt{2}$
- ( ) 0

Correct

The slope of this line segment is $\dfrac{0-1}{1-0} = -1$

10. Suppose that we have two sets, $A = \{a, b\}$ and $Z = \{x, y\}$. How many different functions $F : A \to Z$ are possible? **1 / 1 point**

- ( ) There are none
- ( ) There are infinitely many
- ( ) 1
- (●) 4

Correct

A function $F : A \to Z$ is a rule which assigns an element $F(a) \in Z$ to each element $a \in A$.

There are two elements in A; namely, a and b. For each of these elements, there are two assignment choices we could make: x and y.

Here are the four possible functions:

$F(a) = x, F(b) = y$, OR

$F(a) = y, F(b) = x$, OR

$F(a) = x, F(b) = x$, OR

$F(a) = y, F(b) = y$.