DATA SCIENCE MATH SKILLS COURSE

ANSWERS BY JHONATAS SILVA

WEEK 2 – Quizz 1

Practice quiz on the Cartesian Plane

NÚMERO TOTAL DE PONTOS 5

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

   `1 / 1 ponto`

   ○ $(5, 0)$

   ○ $(-5, 0)$

   ◉ $(0, -5)$

   ○ $(1, 1)$

   ✓ **Correto**
   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.

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

   `1 / 1 ponto`

   ◉ $\sqrt{2}$

   ○ 0

   ○ 1

   ○ 2

   ✓ **Correto**
   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 $\sqrt{(3 - 2)^2 + (3 - 2)^2} = \sqrt{2}$.

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

- ○ y = \begin {align}\frac12 x \end {align}
- ○ y -1 = \begin {align} \frac12(x-5)\end {align}
- ◉ y - 1 =\begin {align} \frac12(x-1)\end {align}
- ○ y-3 =\begin {align}\frac12(x-1)\end {align}

✓ **Correto**

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 = \begin {align} \frac{3-1}{5-1} = \frac12\end {align}

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

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

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

- ○ $(0, 0)$
- ○ $(3, 2)$
- ◉ $(2, 1)$
- ○ $(2, 3)$

✓ **Correto**

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.

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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 ponto**

- ◉ 2
- ○ 0
- ○ 1
- ○ −1

✓ **Correto**

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.

Answers by Jhonatas Gonçalo Taveira da Silva for IronHack lab assignment for Statistics.

Practice quiz on Types of Functions

NÚMERO TOTAL DE PONTOS 6

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 ponto**

   ○ $f(1) = 4$, $f(2) = 4$, and $f(10) = 4$.

   ○ $f(a) = 4a$, for each $a \in A$

   ○ $f(1) = 4$, $f(2) = 40$, and $f(10) = 8$.

   ⦿ $f(1) = 5$, $f(2) = 8$, and $f(10) = 40$.

   > ✓ **Correto**
   > 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 $Z = \{H, S\}$ **0 / 1 ponto**

   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 $D(a) = S$

   ⦿ $T(a) = -$ and $D(a) = H$

   ○ $T(a) = -$ and $D(a) = S$

   ○ $T(a) = +$ and $D(a) = H$

   > ! **Incorreto**
   > This pair of function values corresponds to a false *negative*.

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 ponto`

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

✓ **Correto**

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.

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

`1 / 1 ponto`

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

✓ **Correto**

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.

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

`1 / 1 ponto`

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

✓ **Correto**

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!

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

`1 / 1 ponto`

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

- ◉ 17
- ○ −3
- ○ 14.7
- ○ 3

✓ **Correto**

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.

Answers by Jhonatas Gonçalo Taveira da Silva for IronHack lab assignment for Statistics.

IRON HACK

Week 2 Quizz 3

Graded quiz on Cartesian Plane and Types of Function

NOTA DO ENVIO MAIS RECENTE
100%

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

   1/1 ponto

   ○ $(-4, 5)$

   ⦿ $(7, -1)$

   ○ $(0, 0)$

   ○ $(5, 7)$

   ✓ **Correto**
   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 ponto

   ○ $(-5, 1)$

   ○ $(-4, -7)$

   ⦿ $(7, 11)$

   ○ $(5, -1)$

   ✓ **Correto**
   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 ponto

   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?

   ○ A

   ○ B

   ⦿ C

   ○ D

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

Answers by Jhonatas Gonçalo Taveira da Silva for IronHack lab assignment for Statistics.

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

1 / 1 ponto

○ 25

◉ 5

○ 1

○ -25

✓ **Correto**

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

In this case we have:

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

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

1 / 1 ponto

◉ -1

○ 1

○ $\sqrt{2}$

○ 0

✓ **Correto**

The slope of this line segment is \begin {align}\frac{0-1}{1-0} = -1\end {align}

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

1 / 1 ponto

○ $y - 5 = -2(x - 4)$

○ $(5, 4)$

○ $y - 4 = 2(x - 5)$

◉ $y - 4 = -2(x - 5)$

✓ **Correto**

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.

Answers by Jhonatas Gonçalo Taveira da Silva for IronHack lab assignment for Statistics.

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

1 / 1 ponto

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

✓ **Correto**

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.

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

1 / 1 ponto

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

✓ **Correto**

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.

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

1 / 1 ponto

- ◯ 2
- ◯ None
- ◯ infinitely many
- ⦿ 1

✓ **Correto**

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

Answers by Jhonatas Gonçalo Taveira da Silva for IronHack lab assignment for Statistics.

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 ponto

○ 1

○ There are infinitely many

◉ 4

○ There are none

✓ **Correto**

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

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

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

1/1 ponto

○ 2

◉ Infinitely many

○ 1

○ None

✓ **Correto**

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

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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 ponto

○ g is strictly decreasing.

○ g is strictly increasing.

○ All of the above.

◉ g is neither strictly increasing nor strictly decreasing.

✓ **Correto**

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

Answers by Jhonatas Gonçalo Taveira da Silva for IronHack lab assignment for Statistics.

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

⦿ \begin {align}\frac12\end {align}

◯ 2

◯ 4

◯ $\sqrt{20}$

✓ **Correto**

The slope of this line segment is \begin {align}\frac{3-1}{5-1} = \frac12\end {align}, where $3 - 1$ is the rise and $5 - 1$ is the run.

Answers by Jhonatas Gonçalo Taveira da Silva for IronHack lab assignment for Statistics.