WEEK 1

1. Building Blocks for Problem Solving - Practice quiz on Sets (3 questions)

2. The infinite World of Real Numbers - Practice quiz on the Number Line, including Inequalities (8 questions)

Practice quiz on the Number Line, including Inequalities

PUNTOS TOTALES DE 8

1. Which of the following real numbers is **_not_** an integer?   1 punto

   ○ 7

   ◉ 4.3

   ○ −3

   ○ 0

2. Which of the following is the absolute value $|-7|$ of the number -7?   1 punto

   ○ 1

   ○ 0

   ◉ 7

   ○ −7

3. Suppose I tell you that x and y are two real numbers which make the statement $x < y$ true. Which pair of   1 punto
   numbers **_cannot_** be values for x and y?

   ◉ $x = 5$ and $y = 3.3$

   ○ $x = 1$ and $y = 7.3$

   ○ $x = -17.3$ and $y = -17.1$

   ○ $x = -1$ and $y = 0$

4. Suppose I tell you that w is a real number which makes both of the following statements true: $w > 1$ and   1 punto
   $w < 1.2$. Which of the following numbers could be w?

   ○ $w = 0$

   ○ $w = 11$

   ◉ $w = 1.05$

   ○ $w = 1.2$

5. Suppose that x and y are two real numbers which satisfy $x + 3 = 4y + 1$. **Which of the following**   1 punto
   statements are false?

   ○ $x = 4y - 2$

   ○ $2x + 6 = 8y + 2$

   ◉ $x = 4y$

   ○ $x + 2 = 4y$

6. Which of the following real numbers is in the open interval $(2, 3)$?   1 punto

   ○ 2

   ◉ 2.1

   ○ 3

   ○ 1

7. Which of the following real numbers are in the open ray $(3.1, \infty)$?   1 punto

   ○ 0

   ○ 3.1

   ◉ 4.75

   ○ −5

8. Which of the following values for x solves the equation $-3x + 2 = -4$ 1 punto

   ○ $x = -2$

   ◉ $x = 2$

   ○ All values of x such that $x \leq 2$

   ○ $x = \frac{2}{3}$

3. That Jagged S Symbol - Practice quiz on Simplification Rules and Sigma
   Notation (6 questions)

Practice quiz on Simplification Rules and Sigma Notation

PUNTOS TOTALES DE 6

1. Which of the numbers below is equal to the following summation: $\sum_{i=1}^{3} i^2$?   1 punto

   ○ 30
   ◉ 14
   ○ 1
   ○ 9

2. Suppose that $A = \sum_{k=1}^{100} k^4$ and $B = \sum_{j=1}^{100} j^4$ 1 punto

   Which of the following statements is true?

   ○ There is not enough information to do the problem
   ○ $A > B$
   ○ $B > A$
   ◉ $A = B$

3. Which of the numbers below is equal to the summation $\sum_{i=1}^{10} 7$?   1 punto

   ◉ 70
   ○ 7
   ○ 55
   ○ 0

4. Suppose that $X = \sum_{i=1}^{5} i^3$ and $Y = \sum_{i=1}^{5} i^4$.   1 punto

   Which of the following expressions is equal to the summation $\sum_{i=1}^{5} (2i^3 + 5i^4)$?

   ○ $X + Y$
   ○ 7
   ○ 3375
   ◉ $2X + 5Y$

5. Which of the following numbers is the mean μ_Z of the set $Z = \{-2, 4, 7\}$?   1 punto

   ○ $\frac{13}{3}$
   ◉ 3
   ○ 4
   ○ 9

6. Suppose the set X has five numbers in it: $X = \{x_1, x_2, x_3, x_4, x_5\}$. Which of the following expression   1 punto
   represents the mean of the set X?

   ○ $\frac{1}{5}[\sum_{i=1}^{5}(x_i - \mu_X)^2]$

   ○ $\frac{1}{N}[\sum_{i=1}^{N} x_i]$

   ◉ $\frac{1}{5}[\sum_{i=1}^{5} x_i]$

   ○ $\sum_{i=1}^{5} x_i$

4. That Jagged S Symbol - Graded quiz on Sets, Number Line, Inequalities, Simplification, and Sigma Notation (13 questions)

Graded quiz on Sets, Number Line, Inequalities, Simplification, and Sigma Notation

PUNTOS TOTALES DE 13

1. Let $B = \{3, 5, 10, 11, 14\}$. Is the following statement true or false: $3 \notin B$ (1 punto)

   ○ True

   ⦿ False

2. Let $A = \{1, 3, 5\}$ and $B = \{3, 5, 10, 11, 14\}$. Which of the following sets is equal to the union $A \cup B$?   (1 punto)

   ○ $\{1, 10, 18\}$

   ○ $\{3, 5, 10, 11, 14\}$

   ⦿ $\{1, 3, 5, 10, 11, 14\}$

   ○ $\{1, 3, 5, 3, 5, 10, 11, 14\}$

3. How many real numbers are there between the integers 1 and 4?   (1 punto)

   ○ None

   ○ 4

   ⦿ Infinitely many

   ○ 2

4. Suppose I tell you that x and y are two real numbers which make the statement $x \geq y$ true. Which pair of   (1 punto) numbers **_cannot_** be values for x and y?

   ○ $x = 2$ and $y = 1$

   ○ $x = 10$ and $y = 10$

   ⦿ $x = -1$ and $y = 0$

   ○ $x = 5$ and $y = 3.3$

5. Suppose that z and w are two positive numbers with $z < w$. Which of the following inequalities is false?   (1 punto)

   ○ $-5z < -5w$

   ○ $z + 3 < w + 3$

   ⦿ $-z > -w$

   ○ $w - 7 > z - 7$

6. Find the set of all x which solve the inequality $-2x + 5 \leq 7$ (1 punto)

   ⦿ $x \geq -1$

   ○ $x \leq -1$

   ○ $x = -1$

   ○ $x \geq -6$

7. Which of the following real numbers is not in the closed interval $[2, 3]$ (1 punto)

   ⦿ 1

   ○ 2.1

   ○ 2

   ○ 3

8. Which of the following intervals represents the set of all solutions to: (1 punto)

   $-5 \leq x + 2 < 10?$

   ○ $[-7, 8)$

   ⦿ $[-5, 10)$

   ○ $[-7, 8]$

   ○ $(7, 8)$

9. Which of the numbers below is equal to the following summation: $\sum_{k=2}^{5} 2k$?   1 punto

○ 4
○ 14
○ 10
◉ 28

10. Suppose we already know that $\sum_{k=1}^{20} k = 210$. Which of the numbers below is equal to $\sum_{k=1}^{20} 2k$?   1 punto

○ 2
○ 210
◉ 420
○ 40

11. Which of the numbers below is equal to the summation $\sum_{i=2}^{10} 7$?   1 punto

○ 48
○ 70
○ 7
◉ 63

12. Which of the following numbers is the variance of the set $Z = \{-2, 4, 7\}$?   1 punto

○ 69
◉ 42
○ $\sqrt{14}$
○ 14

13. Which of the following sets does *not* have zero variance? (hint: don't do any calculation here, just think!)   1 punto

○ $\{0, 0, 0, 0, 0, 0, 0\}$
○ $\{5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5\}$
◉ $\{2, 5, 9, 13\}$
○ $\{1, 1, 1, 1\}$

WEEK 2

1. Descartes Was Really Smart - Practice quiz on the Cartesian Plane (5 questions)

Practice quiz on the Cartesian Plane

PUNTOS TOTALES DE 5

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

   ◉ $(0, -5)$

   ○ $(5, 0)$

   ○ $(1, 1)$

   ○ $(-5, 0)$

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

   ◉ $\sqrt{2}$

   ○ 1

   ○ 2

   ○ 0

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

   ◉ $y - 1 = \frac{1}{2}(x - 1)$

   ○ $y = \frac{1}{2}x$

   ○ $y - 1 = \frac{1}{2}(x - 5)$

   ○ $y - 3 = \frac{1}{2}(x - 1)$

4. Which of the following points is on the line with equation: 1 punto

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

   ○ $(3, 2)$

   ◉ $(2, 1)$

   ○ $(0, 0)$

   ○ $(2, 3)$

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

   ○ 0

   ◉ 2

   ○ -1

   ○ 1

2. Input-Output Machines - Practice quiz on Types of Functions (6 questions)

Practice quiz on Types of Functions

PUNTOS TOTALES DE 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 punto

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

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 punto

   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 $D(a) = H$

   ○ $T(a) = -$ and $D(a) = S$

   ○ $T(a) = +$ and $D(a) = S$

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 punto

○ $(-1, 0)$

◉ $(2, -1)$

○ $(1, 0)$

○ $(0, -1)$

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

○ The graph of $s(x) = x^2$

○ The graph of $g(x) = x + 2$

○ The graph of $f(x) = 2x$

◉ The graph of $h(x) = x - 1$

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

○ h is neither a strictly increasing function nor a strictly decreasing function.

○ All statements are correct

○ h is a strictly increasing function

◉ h is a strictly decreasing function

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

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

○ -3

○ 3

○ 14.7

◉ 17

3. Input-Output Machines - Graded quiz on Cartesian Plane and Types of Function (13 questions)

Graded quiz on Cartesian Plane and Types of Function

PUNTOS TOTALES DE 13

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

◉ $(7, -1)$

○ $(0, 0)$

○ $(-4, 5)$

○ $(5, 7)$

2. Which of the following points is in the first quadrant of the Cartesian Plane? 1 punto

○ $(5, -1)$

○ $(-4, -7)$

○ $(-5, 1)$

◉ $(7, 11)$

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

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?

○ D

◉ C

○ B

○ A

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

○ 25

○ -25

○ 1

◉ 5

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

- ⦿ -1
- ◯ 1
- ◯ $\sqrt{2}$
- ◯ 0

6. Find the point-slope form of the equation of the line with slope -2 that goes through the point $(5, 4)$.   1 punto

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

7. Which of the following equations is for a line with the same slope as $y = -3x + 2$?   1 punto

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

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

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

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

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

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 punto

- ⦿ 4
- ◯ There are none
- ◯ There are infinitely many
- ◯ 1

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

- ◯ 2
- ◯ 1
- ⦿ Infinitely many
- ◯ None

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 punto

- ◯ g is strictly decreasing.
- ◯ g is strictly increasing.
- ⦿ g is neither strictly increasing nor strictly decreasing.
- ◯ All of the above.

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

- ◯ 4
- ◯ $\sqrt{20}$
- ◯ 2
- ⦿ $\frac{1}{2}$

WEEK 3

1. This is about that derivative stuff - Practice quiz on Tangent Lines to Functions (2 questions)

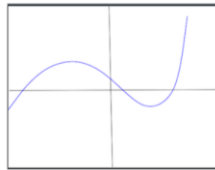## Practice quiz onTangent Lines to Functions

PUNTOS TOTALES DE 2

1. Suppose that $f : \mathbb{R} \to \mathbb{R}$ is a function. Which of the following expressions corresponds to $f'(2)$, the slope (1 punto) of the tangent line to the graph of $f(x)$ at $x = 2$?

○ $f'(2) = mx + b$

○ $f'(2) = 2$

◉ $f'(2) = \lim_{h \to 0} \frac{f(2+h) - f(2)}{h}$

○ $f'(2) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$

2. Suppose that $h : \mathbb{R} \to \mathbb{R}$ is a function whose graph is shown as the blue curve in the figure. For how many (1 punto) values of a is $h'(a) = 0$?

◉ 3

○ Never

○ Always

○ 2

2. Fast Growth, Slow Growth - Practice quiz on Exponents and Logarithms (12 questions)

Practice quiz on Exponents and Logarithms

PUNTOS TOTALES DE 12

1. Re write the number $784 = 2 \times 2 \times 2 \times 2 \times 7 \times 7$ using exponents. (1 punto)

◉ $(2^4)(7^2)$

○ $(16^4)(49^2)$

○ $(2 \times 7)^6$

○ $(2^6)(7^6)$

2. What is $(x^2 - 5)^0$? (1 punto)

○ -4

○ $(x^2) - 5$

◉ 1

○ (x^2)

3. Simplify $((x - 5)^2)^{-3}$ (1 punto)

○ $(x - 5)^{-1}$

◉ $(x - 5)^{-6}$

○ $(x - 5)^{-5}$

○ $(x - 5)$

4. Simplify $\left(\frac{8^2}{8^7}\right)^2$ (1 punto)

◉ 8^{-10}

○ 8^{-4}

○ 8^{-5}

○ 8^{-1}

9

5. $\log 35 = \log 7 + \log x$ `1 punto`

Solve for x

- ○ 28
- ○ 4
- ● 5
- ○ 7

6. $\log_2(x^2 + 5x + 7) = 0$ `1 punto`

Solve for x

- ● $x = -2$ or $x = -3$
- ○ $x = 2$ or $x = 3$
- ○ $x = 3$
- ○ $x = 2$

7. Simplify $\log_2 72 - \log_2 9$ `1 punto`

- ○ 4
- ○ $\log_2 63$
- ● 3
- ○ $\log_2 4$

8. Simplify $\log_3 9 - \log_3 3 + \log_3 5$ `1 punto`

- ○ $\log_3 8$
- ○ 8
- ○ 15
- ● $\log_3 15$

9. Simplify $\log_2(3^8 \times 5^7)$ `1 punto`

- ○ $15 \times \log_2 56$
- ● $(8 \times \log_2 3) + (7 \times \log_2 5)$
- ○ $(5 \times \log_2 3) + (8 \times \log_2 5)$
- ○ $56 \times \log_2 15$

10. If $\log_{10} y = 100$, what is $\log_2 y = ?$ `1 punto`

- ○ 332.19
- ● 500
- ○ 301.03
- ○ 20

11. A tree is growing taller at a continuous rate. In the past 12 years it has grown from 3 meters to 15 meters. `1 punto`
What is its rate of growth per year?

- ○ 10.41%
- ○ 13.41%
- ○ 12.41%
- ● 11.41%

12. Bacteria can reproduce exponentially if not constrained. Assume a colony grows at a continually `1 punto`
compounded rate of 400% per day. How many days before a colony with initial mass of 6.25×10^{-10}
grams weights 1000 Kilograms?

- ○ 875 days
- ● 87.5 days
- ○ 8.75 days
- ○ 0.875 days

3. Fast Growth, Slow Growth - Graded quiz on Tangent Lines to Functions, Exponents and Logarithms (13 questions)

and Logarithms

PUNTOS TOTALES DE 13

1. Convert $\dfrac{1}{49}$ to exponential form, using 7 as the factor.   `1 punto`

   ○ 49^{-1}

   ◉ 7^{-2}

   ○ (7^2)

   ○ $\dfrac{7}{7^3}$

2. A light-year (the distance light travels in a vacuum in one year) is $9,460$ trillion meters. Express in scientific `1 punto` notation.

   ○ 9.46×10^{15} meters.

   ○ 9460×10^{12} meters

   ◉ 9.46×10^{15} kilometers

   ○ 0.946×10^{16}

3. Simplify $(x^8)(y^3)(x^{-10})(y^{-2})$ `1 punto`

   ○ $(x)(y^{-2})$

   ◉ $(x^{-2})(y)$

   ○ $(x^2)(y)$

   ○ $(x^{-80})(y^{-6})$

4. Simplify $[(x^4)(y^{-6})]^{-1}$ `1 punto`

   ○ $(x^3)(y^{-7})$

   ◉ $(x^{-4})(y^6)$

   ○ $\dfrac{(x^{-4})}{(y^6)}$

   ○ $\dfrac{(x^4)}{(y^{-6})}$

5. Solve for x: `1 punto`

   $\log_2 (39x) - \log_2 (x-5) = 4$

   ◉ $\dfrac{-80}{23}$

   ○ $\dfrac{39}{23}$

   ○ $\dfrac{80}{38}$

   ○ $\dfrac{23}{80}$

6. Simplify this expression: `1 punto`

   $\left(x^{\frac{1}{2}}\right)^{\frac{-3}{2}}$

   ◉ $x^{\frac{-3}{4}}$

   ○ x^{-1}

   ○ $x^{-\frac{4}{x}}$

7. Simplify $\log_{10} 1000 + \log_{10} \frac{1}{10000}$ `1 punto`

   ○ 1

   ○ $\log_{10} -10$

   ◉ -1

   ○ $\frac{1}{10}$

8. If $\log_3 19 = 2.680$, what is $\log_9 19$?   `1 punto`

   ◉ 1.304

   ○ 0.4347

   ○ 5.216

   ○ 0.8934

9. If $\log_{10} b = 1.8$ and $\log_a b = 2.5752$, what is a?   1 punto

   ○ 4

   ○ 3

   ⦿ 5

   ○ 6

10. An investment of $1,600$ is worth $7,400$ after 8.5 years. What is the   1 punto
    continuously compounded rate of return of this investment?

    ○ 17.01%

    ○ 20.01

    ⦿ 18.02%

    ○ 19.01%

11. A pearl grows in an oyster at a continuously compounded rate of .24 per   1 punto
    year. If a 25-year old pearl weighs 1 gram, what did it weigh when it began to
    form?

    ⦿ 0.002478

    ○ 0.0002478

    ○ 0.2478

    ○ 0.02478

12. $\log_2 z = 6.754$. What is $\log_{10}(z)$?   1 punto

    ○ 0.49185

    ⦿ 2.03316

    ○ 0.82956

    ○ 1.3508

13. Suppose that $g : \mathbb{R} \to \mathbb{R}$ is a function, and that $g(1) = 10$. Suppose that $g'(a)$ is negative for every single   1 punto
    value of a.Which of the following could possibly be $g(1.5)$?

    ⦿ $g(1.5) = 9.7$

    ○ $g(1.5) = 11$

    ○ $g(1.5) = 103.4$

    ○ $g(1.5) = 10.1$

WEEK 4

1. Basic Probability Definitions - Practice quiz on Probability Concepts (9
   questions)

Practice quiz on Probability Concepts

PUNTOS TOTALES DE 9

1. If $x =$ "It is raining," what is $\sim (\sim x)$?   1 punto

   ○ "It is not raining"

   ○ "It is always raining"

   ● "It is raining"

   ○ "It is never raining"

2. If the statement "I am 25 years old" is assigned probability 0, what probability is assigned to the statement   1 punto
   "I am not 25 years old"?

   ● 1

   ○ Unknown

   ○ -1

   ○ 0

3. If I assign to the statement x = "it will rain today" a probability of $p(x) = 0.35$, what probability must I   1 punto
   assign to the statement "it will not rain today?"

   ○ .5

   ○ 0

   ○ .35

   ● .65

4. Is the following collection of statements a probability distribution?   1 punto

   1. I own a Toyota pickup truck

   2. I do not own a Toyota pickup truck

   3. I own a non-Toyota pickup truck

   4. I do not own a non-Toyota pickup truck

   ○ No

   ● Yes

5. I don't know what it means to be "ingenuous." What probability would I assign to the statement, "I am   1 punto
   ingenuous OR I am not ingenuous"?

   ○ -1

   ○ 0

   ● .5

   ○ 1

6. A friend of mine circumscribes a circle inside a square, so that the diameter of the circle and the edge of   1 punto
   the square are the same length. He asks me to close my eyes and pick a point at random inside the
   square. He says the probability that my point will also be inside the circle is $\frac{\pi}{4}$

   Is this correct?

   ● Yes

   ○ No

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7. The probability of drawing a straight flush (including a Royal Flush) in a five-card poker hand is 0.0000153908 `1 punto`

   What is the probability of **not** drawing a straight flush?

   ◉ .9999846092

   ○ .9996582672

   ○ .9967253809

   ○ .9999745688

8. What is the probability that a fair, six-sided die will come up with a prime number? (Recall that prime numbers are positive integers other than 1 that are divisible only by themselves and 1) `1 punto`

   ○ $\frac{1}{2}$

   ◉ $\frac{2}{3}$

   ○ $\frac{1}{3}$

   ○ $\frac{1}{6}$

9. The joint probability p (the die will come up 5, the next card will be a heart) Is equal to the joint probability: `1 punto`

   ◉ p (the next card will **not** come up 5, the next card will be a heart)

   ○ p (the next card will be a heart, the die will **not** come up 5)

   ○ p (the die will **not** come up 5, the next card will **not** be a heart)

   ○ p (the next card will be a heart, the die will come up 5)

2. Problem Solving Methods - Practice quiz on Problem Solving (9 questions)

Practice quiz on Problem Solving

PUNTOS TOTALES DE 9

1. I am given the following 3 joint probabilities: `1 punto`

   p(I am leaving work early, there is a football game that I want to watch this afternoon) = .1

   p(I am leaving work early, there is not a football game that I want to watch this afternoon) = .05

   p(I am not leaving work early, there is not a football game that I want to watch this afternoon) = .65

   What is the probability that there is a football game that I want to watch this afternoon?

   ◉ .3

   ○ .1

   ○ .35

   ○ .2

2. The Joint probability of my summiting Mt. Baker in the next two years AND publishing a best-selling book in the next two years is .05. If the probability of my publishing a best-selling book in the next two years is 10%, and the probability of my summiting Mt. Baker in the next two years is 30%, are these two events dependent or independent? `1 punto`

   ◉ Dependent

   ○ Independent

3. The Joint probability of my summiting Mt. Baker in the next two years AND my publishing a best-selling book in the next two years is .05. `1 punto`

   If the probability of my publishing a best-selling book in the next two years is 10%, and the probability of my summiting Mt. Baker in the next two years is 30%, what is the probability that (sadly) in the next two years I will neither summit Mt. Baker nor publish a best-selling book?

   ○ .25

   ◉ .65

   ○ .9

   ○ .95

4. I have two coins. One is fair, and has a probability of coming up heads of .5. The second is bent, and has a   `1 punto`
probability of coming up heads of .75. If I toss each coin once, what is the probability that *at least* one of
the coins will come up heads?

  ○ .375

  ○ .875

  ◉ .625

  ○ 1.0

5. What is $\dfrac{11!}{9!}$? `1 punto`

  ○ $4,435,200$

  ◉ 110

  ○ $110,000$

  ○ $554,400$

6. What is the probability that, in six throws of a die, there will be exactly one each of "1" "2" "3" "4" "5" `1 punto`
and "6" ?

  ○ .00187220

  ◉ .01543210

  ○ .01432110

  ○ .01176210

7. On 1 day in 1000, there is a fire and the fire alarm rings. `1 punto`

On 1 day in 100, there is no fire and the fire alarm rings (false alarm)

On 1 day in $10,000$, there is a fire and the fire alarm does not ring (defective alarm).

On $9,889$ days out of $10,000$, there is no fire and the fire alarm does not ring.

If the fire alarm rings, what is the (conditional) probability that there is a fire?

Written p(there is a fire | fire alarm rings)

  ○ 90.9%

  ○ 1.12%

  ○ 1.1%

  ◉ 9.09%

8. On 1 day in 1000, there is a fire and the fire alarm rings. `1 punto`

On 1 day in 100, there is no fire and the fire alarm rings (false alarm)

On 1 day in $10,000$, there is a fire and the fire alarm does not ring (defective alarm).

On $9,889$ days out of $10,000$, there is no fire and the fire alarm does not ring.

If the fire alarm does not ring, what is the (conditional) probability that there is a fire?

p(there is a fire | fire alarm does not ring)

  ○ 1.0001%

  ○ $.01000\%$

  ◉ 0.01011%

  ○ $.10011\%$

9. A group of 45 civil servants at the State Department are newly qualified to serve as Ambassadors to `1 punto`
foreign governments. There are 22 countries that currently need Ambassadors. How many distinct groups
of 22 people can the President promote to fill these jobs?

  ○ 8.2334 \times (10^12)

  ○ =2.429*(10^-13)

  ○ =1.06*(10^35)

  ◉ $$4.1167 \times (10^12)

3. Applying Bayes Theorem and the Binomial Theorem - Practice quiz on Bayes
Theorem and the Binomial Theorem (9 questions)

Practice quiz on Bayes Theorem and the Binomial Theorem

PUNTOS TOTALES DE 9

1. A jewelry store that serves just one customer at a time is concerned about the safety of its isolated customers.

   1 punto

   The store does some research and learns that:

   - 10% of the times that a jewelry store is robbed, a customer is in the store.
   - A jewelry store has a customer on average 20% of each 24-hour day.
   - The probability that a jewelry store is being robbed (anywhere in the world) is 1 in 2 million.

   What is the probability that a robbery will occur while a customer is in the store?

   ○ $\dfrac{1}{500000}$

   ◉ $\dfrac{1}{2000000}$

   ○ $\dfrac{1}{4000000}$

   ○ $\dfrac{1}{5000000}$

2. If I flip a fair coin, with heads and tails, ten times in a row, what is the probability that I will get exactly six heads?

   1 punto

   ○ 0.021

   ○ 0.187

   ◉ 0.2051

   ○ 0.305

3. If a coin is bent so that it has a 40% probability of coming up heads, what is the probability of getting *exactly* 6 heads in 10 throws?

   1 punto

   ○ 0.0974

   ○ 0.1045

   ◉ 0.1115

   ○ 0.1219

4. A bent coin has 40% probability of coming up heads on each independent toss. If I toss the coin ten times, what is the probability that I get at least 8 heads?

   1 punto

   ◉ 0.0123

   ○ 0.0132

   ○ 0.0213

   ○ 0.0312

5. Suppose I have a bent coin with a 60% probability of coming up heads. I throw the coin ten times and it comes up heads 8 times.

   1 punto

   What is the value of the "likelihood" term in Bayes' Theorem -- the conditional probability of the data given the parameter.

   ○ 0.122885

   ◉ 0.120932

   ○ 0.168835

   ○ 0.043945

6. We have the following information about a new medical test for diagnosing cancer.

   1 punto

   Before any data are observed, we know that 5% of the population to be tested actually have Cancer.

   Of those tested who do have cancer, 90% of them get an accurate test result of "Positive" for cancer. The other 10% get a false test result of "Negative" for Cancer.

   Of the people who do not have cancer, 90% of them get an accurate test result of "Negative" for cancer. The other 10% get a false test result of "Positive" for cancer.

   What is the conditional probability that I have Cancer, if I get a "Positive" test result for Cancer?

   **Formulas in the feedback section are very long, and do not fit within the standard viewing window. Therefore, the font is a bit smaller and the word "positive test" has been abbreviated as PT.

   ○ 9.5%

   ○ 4.5%

   ○ 67.9%

   ◉ 32.1% probability that I have cancer

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7.   We have the following information about a new medical test for diagnosing cancer.   [1 punto]

Before any data are observed, we know that 8% of the population to be tested actually have Cancer.

Of those tested who do have cancer, 90% of them get an accurate test result of "Positive" for cancer.

The other 10% get a false test result of "Negative" for Cancer.

Of the people who do not have cancer, 95% of them get an accurate test result of "Negative" for cancer.

The other 5% get a false test result of "Positive" for cancer.

What is the conditional probability that I have cancer, if I get a "Negative" test result for Cancer?

○ 88.2%

○ 0.9%

○ 99.1%

◉ .80%

8.   An urn contains 50 marbles – 40 blue and 10 white. After 50 draws, exactly 40 blue and 10 white are observed.   [1 punto]

You are not told whether the draw was done "with replacement" or "without replacement."

What is the probability that the draw was done with replacement?

○ 1

◉ 12.27%

○ 87.73%

○ 13.98%

9.   According to Department of Customs Enforcement Research: 99% of people crossing into the United States are not smugglers.   [1 punto]

The majority of all Smugglers at the border (65%) appear nervous and sweaty.

Only 8% of innocent people at the border appear nervous and sweaty.

If someone at the border appears nervous and sweaty, what is the probability that they are a Smuggler?

○ 7.58%

○ 92.42%

○ 7.92%

◉ 8.57%

4.   Applying Bayes Theorem and the Binomial Theorem - Probability (basic and Intermediate) Graded Quiz (12 questions)

Probability (basic and Intermediate) Graded Quiz

PUNTOS TOTALES DE 12

1. What additional statement, added to the three below, forms a probability distribution?   1 punto

    (1) I missed only my first class today

    (2) I missed only my second class today

    (3) I missed both my first and second class today

    ○ I missed no classes today

    ◉ I did not miss my first or second class today

    ○ I missed either my first or my second class today but not both

    ○ I missed all my classes today

2. My friend takes 10 cards at random from a 52-card deck, and places them in a box. Then he puts the other   1 punto
   42 cards in a second, identical box. He hands me one of the two boxes and asks me to draw out the top
   card. What is the probability that the first card I draw will be the Ace of Spades?

    ○ $\frac{1}{10}$

    ○ $\frac{1}{26}$

    ○ $\frac{1}{42}$

    ◉ $\frac{1}{52}$

3. I will go sailing today if it does not rain. Are the following two statements Independent or dependent?   1 punto

    (1) "I will go sailing today"

    (2) "It will not rain today"

    ○ Dependent

    ◉ Independent

4. The probability that I will go sailing today AND the fair six-sided die will come up even on the next roll is .3.   1 punto

    If these events are independent, what is the probability that I will go sailing today?

    ◉ .6

    ○ .3

    ○ .1

    ○ .5

5. I have two coins. One is fair, and has a probability of coming up heads of .5.   1 punto
   The second is bent, and has a probability of coming up heads of .75.
   If I toss each coin once, what is the probability that at least one of the coins will come up tails?

    ○ 0.874

    ○ 1.0

    ○ 0.375

    ◉ 0.625

6. What is the probability, when drawing 5 cards from a fair 52-card deck, of drawing a "full house" (three of a   1 punto
   kind and a pair) in the form AAABB?

    ○ 0.006410256

    ◉ 0.001440576

    ○ 0.1320965

    ○ 0.000267094

7. If it rains, I do not go sailing. It rains 10% of days; I go sailing 3% of days.   1 punto

    If it does not rain, what is the (conditional) probability that I go sailing?

    Written "p(I go sailing | it does not rain)"?

    ○ 3.333%

    ○ 3.448%

    ◉ 3.000%

    ○ 3.125%

8. I am at my office AND not working 2% of the time. I am at my office 10% of the time. What is the conditional probability that I am not working, if I am at my office?   `1 punto`

- ◉ 20%
- ○ 10%
- ○ 1%
- ○ 50%

9. The factory quality control department discovers that the conditional probability of making a manufacturing mistake in its precision ball bearing production is 4% on Tuesday, 4% on Wednesday, 4% on Thursday, 8% on Monday, and 12% on Friday.   `1 punto`

The Company manufactures an equal amount of ball bearings (20%) on each weekday. What is the probability that a defective ball bearing was manufactured on a Friday?

- ○ 20%
- ○ 40%
- ◉ 37.5%
- ○ 12%

10. An Urn contains two white marbles and one black marble. A marble is drawn from the Urn without replacement and put aside without my seeing it. Then a second marble is drawn, and it is white.   `1 punto`

What is the probability that the unknown removed marble is white, and what is the probability that it is black?

- ○ $p(\text{the first marble is white} \mid \text{the second marble is white}) = 0.6667$

  $p(\text{the first marble is black} \mid \text{the second marble is white}) = 0.333$

- ○ $p(\text{the first marble is white} \mid \text{the second marble is white}) = 1.0$

  $p(\text{the first marble is black} \mid \text{the second marble is white}) = 0.0$

- ◉ $p(\text{the first marble is white} \mid \text{the second marble is white}) = 0.3333$

  $p(\text{the first marble is black} \mid \text{the second marble is white}) = 0.6667$

- ○ $p(\text{the first marble is white} \mid \text{the second marble is white}) = .5$

  $p(\text{the first marble is black} \mid \text{the second marble is white}) = .5$

11. What is the probability, if I flip a fair coin with heads and tails ten times in a row, that I get at least 8 heads?   `1 punto`

- ○ .0547
- ○ .1131
- ◉ 0.4395
- ○ .00977

12. Suppose I have either a fair coin or a bent coin, and I don't know which. The bent coin has a 60% probability of coming up heads.   `1 punto`

I throw the coin ten times and it comes up heads 8 times. What is the probability I have the fair coin vs. the probability I have the bent coin?

Assume at the outset there is an equal $(.5, .5)$ prior probability of either coin.

*Please note that in order to fit the entire formula in the feedback, probability has been abbreviated to "prob."

- ○ 26.65
- ◉ 53.30
- ○ 22.47
- ○ 81.24