Data Science Math Skills

Here's the complete list of exercises you need to deliver:

Week 4

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

* Problem Solving Methods - Practice quiz on Problem Solving (9 questions)

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

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

Basic Probability Definitions

Practice quiz on Probability Concepts

NÚMERO TOTAL DE PONTOS 9

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

   - "It is not raining"
   - "It is always raining"
   - "It is never raining"
   - (•) "It is raining"

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

   - -1
   - Unknown
   - 0
   - (•) 1

Practice quiz on Probability Concepts

Teste para praticar • 25 min

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

- ○ $.35$
- ◉ $.65$
- ○ $.5$
- ○ 0

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

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

Practice quiz on Probability Concepts

Teste para praticar • 25 min

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

- ○ .5
- ○ -1
- ○ 0
- ◉ 1

6. A friend of mine circumscribes a circle inside a square, so that the diameter of the circle and the edge of 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 $\frac{\pi}{4}$ — 1 ponto

Is this correct?

- ◉ Yes
- ○ No

Practice quiz on Probability Concepts

Teste para praticar • 25 min

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

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

- ○ $.9996582672$
- ○ $.9967253809$
- ◉ $.9999846092$
- ○ $.9999745688$

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 ponto

- ○ $\frac{2}{3}$
- ○ $\frac{1}{6}$
- ○ $\frac{1}{}$

Practice quiz on Probability Concepts

Teste para praticar • 25 min

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 ponto

- ○ $\frac{2}{3}$
- ○ $\frac{1}{6}$
- ○ $\frac{1}{3}$
- ◉ $\frac{1}{2}$

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 ponto

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

TESTE PARA PRATICAR • 25 MIN

Practice quiz on Probability Concepts

Envie sua tarefa — Retomar

Receber nota

PARA SER APROVADO 75% ou superior

Nota — Ver feedback

100% Mantemos sua pontuação mais alta

Problem Solving Methods

Practice quiz on Problem Solving

NÚMERO TOTAL DE PONTOS 9

1. I am given the following 3 joint probabilities: 1 ponto

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?

- ○ .35
- ○ .1
- ◉ .3
- ○ .2

Practice quiz on Problem Solving

Teste para praticar • 25 min

2. The 1 ponto

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?

- (●) Dependent
- ( ) Independent

3. The 1 ponto

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 $.05$.

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?

- ( ) .9
- (●) .65
- ( ) .95

Practice quiz on Problem Solving

Teste para praticar • 25 min

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 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? — 1 ponto

- ○ .375
- ○ .625
- ◉ .875
- ○ 1.0

5. What is $\frac{11!}{9!}$? — 1 ponto

- ○ $110,000$
- ○ $4,435,200$
- ○ $554,400$
- ◉ 110

Practice quiz on Problem Solving

Teste para praticar • 25 min

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

- (•) .01543210
- ( ) .01176210
- ( ) .01432110
- ( ) .00187220

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

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?

Practice quiz on Problem Solving

Teste para praticar • 25 min

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

Written $p(\text{there is a fire} \mid \text{fire alarm rings})$

- 1.12%
- 9.09%
- 1.1%
- 90.9%

Practice quiz on Problem Solving

Teste para praticar • 25 min

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

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)

- ○ $.01000\%$
- ◉ 0.01011%
- ○ 1.0001%
- ○ $.10011\%$

Practice quiz on Problem Solving

Teste para praticar • 25 min

9. A group of 45 civil servants at the State Department are newly qualified to serve as Ambassadors to 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?

1 ponto

- 8.2334 \times (10^12)
- =1.06*(10^35)
- **$$4.1167 \times (10^12)**
- =2.429*(10^-13)

Entendo que, ao enviar o trabalho de outra pessoa como se fosse meu, pode resultar em crédito zero para esta tarefa. Violações repetidas do Código de Honra do Coursera podem resultar na remoção deste curso ou na desativação da minha conta do Coursera.

Saiba mais sobre o Código de Honra do Coursera

Catarina Pires

Salvar | Enviar

Applying Bayes Theorem and the Binomial Theorem

Practice quiz on Bayes Theorem and the Binomial Theorem

Teste para praticar • 25 min

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

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?

- ○ $\frac{1}{500000}$
- ○ $\frac{1}{2000000}$
- ◉ $\frac{1}{4000000}$
- ○ $\frac{1}{5000000}$

Practice quiz on Bayes Theorem and the Binomial Theorem

Teste para praticar • 25 min

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 ponto

- ○ 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 ponto

- ○ 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 ponto

Practice quiz on Bayes Theorem and the Binomial Theorem

Teste para praticar • 25 min

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 ponto

- 0.0312
- 0.0213
- 0.0132
- **0.0123**

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 ponto

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

- **0.120932**
- 0.122885
- 0.043945
- 0.168835

Practice quiz on Bayes Theorem and the Binomial Theorem

Teste para praticar • 25 min

6. We have the following information about a new medical test for diagnosing cancer. 1 ponto

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.

- ○ 67.9%
- ○ 4.5%
- ◉ 32.1% probability that I have cancer
- ○ 9.5%

Practice quiz on Bayes Theorem and the Binomial Theorem

Teste para praticar • 25 min

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

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?

- ○ 99.1%
- ○ 88.2%
- ◉ 0.9%
- ○ $.80\%$

Practice quiz on Bayes Theorem and the Binomial Theorem

Teste para praticar • 25 min

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

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 ponto

Practice quiz on Bayes Theorem and the Binomial Theorem

Teste para praticar • 25 min

9. According to Department of Customs Enforcement Research: 99% of people crossing into the United States are not smugglers. (1 ponto)

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?

- ○ 7.92%
- ○ 8.57%
- ◉ 7.58%
- ○ 92.42%

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Applying Bayes Theorem and the Binomial Theorem

Probability (basic and Intermediate) Graded Quiz

NÚMERO TOTAL DE PONTOS 12

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

(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 all my 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 no 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 42 cards in a second, identical box. He hands me one of the two boxes and asks me to draw out the top 1 ponto

Probability (basic and Intermediate) Graded Quiz

Teste valendo nota • 50 min

Vencimento Apr 11, 11:59 PM PDT

2. My friend takes 10 cards at random from a 52-card deck, and places them in a box. Then he puts the other 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? 1 ponto

- ○ $\frac{1}{10}$
- ○ $\frac{1}{26}$
- ○ $\frac{1}{42}$
- ◉ $\frac{1}{52}$

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

(1) "I will go sailing today"

(2) "It will not rain today"

- ◉ Dependent
- ○ Independent

Probability (basic and Intermediate) Graded Quiz

Teste valendo nota • 50 min

Vencimento Apr 11, 11:59 PM PDT

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 ponto

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

- ○ .5
- ◉ .6
- ○ .3
- ○ .1

5. I have two coins. One is fair, and has a probability of coming up heads of.5. 1 ponto
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?

- ○ 0.375
- ○ 1.0
- ○ 0.874
- ◉ 0.625

Probability (basic and Intermediate) Graded Quiz

Teste valendo nota • 50 min

Vencimento Apr 11, 11:59 PM PDT

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

- 0.000267094
- 0.1320965
- 0.006410256
- (●) 0.001440576

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

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%
- 3.000%
- 3.448%
- 3.125%

Probability (basic and Intermediate) Graded Quiz

Teste valendo nota • 50 min

Vencimento Apr 11, 11:59 PM PDT

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 ponto

- 1%
- 50%
- 10%
- 20% (selected)

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 ponto

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?

- 40%
- 20%
- 12%
- 37.5% (selected)

Probability (basic and Intermediate) Graded Quiz

Teste valendo nota • 50 min

Vencimento Apr 11, 11:59 PM PDT

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 ponto

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

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

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

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

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

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

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

- p (the first marble is white |the second marble is white) $= .5$

  p(the first marble is black | the second marble is white) $= .5$

Probability (basic and Intermediate) Graded Quiz

Teste valendo nota • 50 min

Vencimento Apr 11, 11:59 PM PDT

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 ponto

- (●) .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 ponto

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