

ProbabilityExerciseSetTwo is due on Thursday, September 15, 2022 at 11:59pm.

The number of attempts available for each question is noted beside the question. If you are having trouble figuring out your error, you should consult the textbook, or ask a fellow student, one of the TA's or your professor for help.

There are also other resources at your disposal, such as the Mathematics Continuous Tutorials. Don't spend a lot of time guessing – it's not very efficient or effective.

Make sure to give lots of significant digits for (floating point) numerical answers. For most problems when entering numerical answers, you can if you wish enter elementary expressions such as $2 \wedge 3$ instead of 8, $\sin(3 * \pi/2)$ instead of -1, $e \wedge (\ln(2))$ instead of 2, $(2 + \tan(3)) * (4 - \sin(5)) \wedge 6 - 7/8$ instead of 27620.3413, etc.

Problem 1. (1 point)

A random experiment produces many possible events. Two of these events are events A and event B . These events are independent of each other and occur with $P(A) = 0.4$ and $P(B) = 0.73$.

Complete parts (a) through (d).

(a) Find $P(A \cap B) = \underline{\hspace{1cm}}$ (use four decimals in your answer)

(b) Find $P(A \cap B^c) = \underline{\hspace{1cm}}$ (use four decimals in your answer)

(c) Find the probability of neither event A nor event B will occur.

$\underline{\hspace{1cm}}$ (use four decimals in your answer)

(d) Find the probability that exactly one of these two events - A , B - will occur.

$\underline{\hspace{1cm}}$ (use four decimals in your answer)

Answer(s) submitted:

- 0.292
- 0.108
- 0.162
- 0.546

submitted: (correct)

recorded: (correct)

Correct Answers:

- 0.292
- 0.108
- 0.162
- 0.546

Problem 2. (1 point)

Two different events are events A and event B exist, where $0 < P(A) < 1$, $0 < P(B) < 1$, $P(A) \neq P(B)$ and $P(A \cap B) = 0$.

A student currently taking a Statistics course analyzes these probabilities and comes to the conclusion that "A and B are independent events."

Is this student correct? Select the correct answer below.

- A. The student is correct. A and B must be independent events because the $P(A \cap B) = 0$.
- B. It student could be correct or incorrect. With what I know, A and B could be independent events or dependent events.
- C. The student is incorrect. A and B cannot be independent events because the $P(A \cap B) = 0$.
- D. None of the above.

Answer(s) submitted:

- C

submitted: (correct)

recorded: (correct)

Correct Answers:

- C

Problem 3. (1 point)

An abbreviated deck of cards consists of four Jacks, four Queens, four Kings, four Aces, and four 10s. For each type of card, there is a ♡, a ◇, a ♣, and a ♠. You are to randomly pick one card from this deck.

(a) Consider the statement: Picking a Jack and picking a ◇ are independent events. Is this statement true or false?

- A. The statement is false. Picking a Jack and picking a ◇ are dependent events..
- B. The statement is true. Picking a Jack and picking a ◇ are independent events.

(b) Consider the statement: Picking an Ace and picking a ♠ are mutually exclusive events. Is this statement true or false?

- A. The statement is false. Picking an Ace and picking a ♠ are not mutually exclusive events.
- B. The statement is true. Picking an Ace and picking a ♠ are mutually exclusive events..

Answer(s) submitted:

- B
- A

submitted: (correct)

recorded: (correct)

Correct Answers:

- B
- A

Problem 4. (1 point)

An Ipsos poll recently surveyed the views of Canadians regarding the needs of the LGBTQ communities when in Canada when it comes to the use of public washrooms. 42% say that a person should be allowed to use the washroom of the gender they identify with. Also, 21% of those surveyed had at most a high school education, the remaining 79% had reported completing some post-secondary education.

Also, 7% of those surveyed had at most a high school education and believed people should be allowed to use the washroom of the gender they identify with.

A person who completed this poll was picked at random.

(a) Compute the probability this person had completed some level of post-secondary education and believes people should be allowed to use the washroom of the gender they identify with.

_____ (use four decimals in your answer)

(b) If the person has completed some level of post-secondary education, what is the probability they believe people should be allowed to use the washroom of the gender they identify with?

_____ (use four decimals in your answer)

(c) If this person believes that people should be allowed to use the washroom of the gender they identify with, what is the probability the person has at most a high school education?

_____ (use four decimals in your answer)

(d) If this person does not believe that people should be allowed to use the washroom of the gender they identify with (there are other beliefs, such as a third category of washroom for example), what is the probability this person has completed some level of post-secondary education?

_____ (use four decimals in your answer)

Answer(s) submitted:

- 0.35
- 0.443
- 0.1667
- 0.7586

submitted: (correct)

recorded: (correct)

Correct Answers:

- 0.35
- 0.443038

- 0.166667
- 0.758621

Problem 5. (1 point)

In a certain population of people, 19% will contract Disease A at some point in their lifetime, 21% will contract Disease B at some point in their lifetime, and 66% will not contract either of these diseases in their lifetime.

A person from this population is randomly chosen.

Part (a) Complete the probability table below. Use two decimals in each of your answers.

Disease	A	A^c	Row Probabilities
B	_____	_____	_____
B^c	_____	_____	_____
Column Probabilities	_____	_____	_____

Part (b) Find the probability that the person chosen contracts Disease A or Disease B . Enter your answer to two decimals. _____

Part (c) Find the probability that the person chosen contracts only one of these two diseases. _____ (use two decimals)

Part (d) Suppose a person contracts Disease A . What is the chance that this person will contract Disease B ? Enter your answer to four decimals. _____

Part (e) If a person contracts Disease B , what is the probability they will also contract Disease A ? _____ (use four decimals)

Answer(s) submitted:

- 0.06
- 0.15
- 0.21
- 0.13
- 0.66
- 0.79
- 0.19
- 0.81
- 1
- 0.34
- 0.28
- 0.3158
- 0.2857

submitted: (correct)

recorded: (correct)

Correct Answers:

- 0.0599999999999999
- 0.15
- 0.21
- 0.13
- 0.66
- 0.79
- 0.19

- 0.81
- 1
- 0.34
- 0.28
- 0.31578947368421
- 0.285714285714285

Problem 6. (1 point)

A national polling company polled Canadians about their coffee consumption and made the following discovery: 82% of Canadians have at least one cup of coffee a day.

Two Canadians are randomly chosen on a randomly chosen day. What is the probability

Part (a) both consume at least one cup of coffee on the chosen day? ____ (Use four decimals in your answer)

Part (b) Refer to the two Canadians chosen in part (a). Compute the probability that neither consumes any coffee over the course of the chosen day. ____ (Use four decimals)

Part (c) Suppose you are to randomly inspect three Canadians on a randomly chosen day. Compute the probability that at least two of the three has consumed at least one cup of coffee. ____ (use four decimals)

Part (d) Suppose you are to randomly pick n -Canadians until the probability that at least one of them has consumed at least one cup of coffee (on the randomly chosen day) is at least 0.96. How large must n be?

$n \geq$ ____ (enter an integer)

Answer(s) submitted:

- 0.6724
- 0.0324
- 0.9145
- 2

submitted: (correct)

recorded: (correct)

Correct Answers:

- 0.6724
- 0.0324
- 0.914464
- 2

Problem 7. (1 point)

In statistical surveys, where individuals are randomly chosen and asked questions, experience has shown that only 50% of people under the age of 25 years of age, and 67% of those between the ages of 25 and 50 years of age will respond. Moreover, 9% of those over the age of 50 will not respond.

A sociologist is to send a questionnaire to a group of randomly chosen people. 22% of the population are younger than 25 years of age, 43% are over the age of 50, the remainder are between the ages of 25 and 50 years of age.

Part (a) What will be the non-response rate here? That is, what proportion of all questionnaires distributed will not be returned? ____ (Use four decimals in your answer)

Part (b) If a questionnaire is responded to, what is the probability that it was completed by someone over the age of 50? ____ (Use four decimals)

Answer(s) submitted:

- 0.2642
- 0.5318

submitted: (correct)

recorded: (correct)

Correct Answers:

- 0.2642
- 0.531802120141343

Problem 8. (1 point)

You ask your roommate to mail a letter for you. Suppose there is a 0.23 probability your roommate will forget to mail it.

Should your roommate mail your letter, there is a 0.91 probability that Canada Post will deliver the letter.

If the letter is never delivered, what is the probability that your roommate mailed the letter? ____ (Use four decimals in your answer)

Answer(s) submitted:

- 0.2315

submitted: (correct)

recorded: (correct)

Correct Answers:

- 0.231540260608085

Problem 9. (1 point)

You have either a \$1-coin or a \$2-coin in your right-pants pocket, but you are unsure which one.

You grab a \$2-coin from your change container - so you can buy yourself a bottle of water before your statistics class - and put it in your right-pants pocket.

Prior to adding the \$2-coin to you pocket, you surmise that the chance of you having a \$1-coin is 5-times more than likely than having a \$2-coin in your right-pants pocket.

You arrive at school and order a bottle of water from a food service outlet on campus. The price of the bottle of water is \$3.24. Since the only money you have on hand is in your right-pants pocket, you reach into your right-pants pocket and randomly pull out one of the two coins. It is a \$2-coin.

What is the probability that you do not have enough money to purchase the water?

Enter your answer to four decimal places.

Answer(s) submitted:

- 0.7143

submitted: (correct)

recorded: (correct)

Correct Answers:

- 0.714285714285714

Problem 10. (1 point)

An individual chooses to go on vacation to Mexico. Their flight from Calgary is not a direct flight, and requires a connection. The traveler considers one of three different airlines that he/she will use to fly to Mexico: Airline A, Airline B, and Airline C. When luggage is required to move from one airplane to another - as is the case in all connecting flights - the traveler has discovered that Airline A will misplace 12% of all luggage; Airline B will misplace 5% of all luggage, and Airline C will misplace 6% of all luggage.

Historically, this traveler has flown with Airline A 25% of the time, Airline B 48% of the time, with the remaining percentage of their flights being with Airline C.

Part (a) What is the probability that this traveler's luggage will not be misplaced? ____ (Use four decimals in your answer)

Part (b) The traveler arrives in Mexico, and their luggage has not arrived with them. What is the probability that this person flew on Airline A? ____ (Use four decimals)

Answer(s) submitted:

- 0.9298
- 0.4274

submitted: (correct)

recorded: (correct)

Correct Answers:

- 0.9298
- 0.427350427350427