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Statistics for Data Science-I

Week 7 Solve with Instructor (graded)

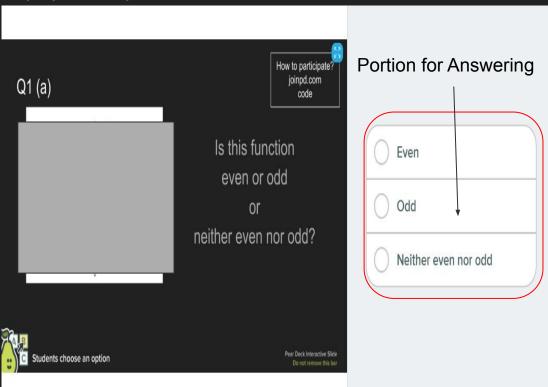
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Statistics I: Week 7 Solve with Instructor

- Keep a notebook and pen ready for solving problems
- How to join?
 - Audio/screenshare on webex click on link sent to you
 - Doubts? Use webex chat. Do not answer questions on webex chat.
 - Join on pear deck joinpd.com (enter code seen on top right)
 - Answer questions only here
- For every question 5 to 15 minutes allotted
 - Question will be shown in a slide for solving
 - If you are done solving, enter your answer at joinpd.com
 - Presenter will provide a solution
 - Questions and discussion

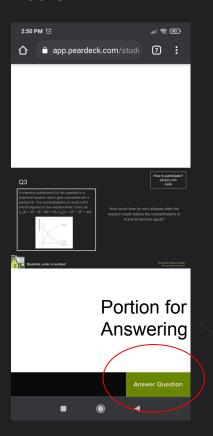
Example Screenshots

Laptop/Desktop



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Mobile



Q1

In a horse race, six horses numbered from 1 to 6 are participating.

Q. What is the probability that all the even numbered horses complete the race at first, second, and third places? (Enter the answer correct to two decimal places)

There are three even numbered horses numbered 2, 4, and 6.

The number of ways these even numbered horses can occupy first three places is 3!.

The remaining last three places can be occupied by odd numbered horses in 3! ways.

Total number of ways in which the race can turn out in which even numbered horses complete first 3 places is $3! \times 3! = 36$.

Total number of ways race can be completed is 6! Ways = 720 ways.

So, the probability that even numbered horses complete race first is 36/720 = 0.05

Q2.

If P(C) = 0.3, $P(A \cup B) = 0.6$, and $P(A \cup B \cup C) = 0.8$.

What is the value of $P((A \cup B) \cap C)$?

Given P(C) = 0.3, P(A \cup B) = 0.6, and P(A \cup B \cup C) = 0.8.

We need to find out the $P((A \cup B) \cap C)$.

Let us consider $(A \cup B)$ as set D.

$$\Rightarrow$$
 P(D) = 0.6 and P(D U C) = 0.8.

we know that $P(D \cup C) = P(C) + P(D) + P(D \cap C)$

$$\Rightarrow$$
 P(D \cap C) = P(C) + P(D) - P(D \cup C)

$$\Rightarrow$$
 P(D \cap C) = 0.35 + 0.6 - 0.8 = 0.1

But D is A \cup B \Rightarrow P((A \cup B) \cap C) = 0.1

Prelude 1 to Q3

In an exam, there are 10 multiple select questions. In each multiple select question, there are 4 options for each question, more than one option could be correct,

Q. Find the number of ways to answer one question.

Given that, for a multiple select question more than one option is correct. So, a student need to select atleast one option and at the most 4 options. All possible ways are:

Only one option could be selected in 4C1 = 4 ways.

Only two options could be selected in 4C2 = 6 ways.

Only three options could be selected in 4C3 = 4 ways.

Continued...

All the four options could be selected in 4C1 = 1 way.

So, Total ways in which an option could be selected = 4+6+4+1=15

Prelude 2 to Q3

In an exam, there are 10 multiple select questions. In each multiple select question,

there are 4 options for each question, more than one option could be correct,

What is the probability of answering one question correctly?

Probability of answering one question correctly

= 1/15

Q3.

In an exam, there are 10 multiple select questions. In each multiple select question, there are 4 options. For each question, more than one option could be correct, if a student chooses all the correct options then he/she gets 4 marks for that question, else he/she will not get any marks for the question.

Q. What is the probability that he/she will score 40 marks in the exam?

She can get 40 marks in only one condition and that is when she will correctly answer all the 10 questions.

As we already know, Probability of answering one question correctly = 1/15

Hence to answer all questions correctly, the probability will be (1/15)^10.

Q4.

In a particular game, the player needs to throw a dart onto a circular board whose radius is 8.5 units. The points allotted to the player are based on where the dart lands. Let r be the distance at which dart lands from the centre of the board. Then the points allotted are as follows:

 $0 \le r < 1 \Rightarrow 10 \text{ points}$

 $1 \le r < 3 \Rightarrow 8$ points

 $3 \le r < 5 \Rightarrow 6$ points

 $5 \le r < 7 \Rightarrow 4 \text{ points}$

 $7 \le r < 8 \Rightarrow 2 \text{ points}$

 $r \ge 8 \Rightarrow 0$ points

Q. Assuming the player is not a professional and that there is an equal chance that the dart could land anywhere on the board, what is the probability that the points scored by the player in one throw is 4?

Enter the answer up to 2 decimals accuracy.

(Assume the dart lands on the board always)

In this game points awarded depends on the place dart lands. The probability that it lands in between particular radius r1 and r2 is directly proportional to the area enclosed between radius r1 and r2.

So, it would be equal to area enclosed between radius r1 and r2 divided by total area.

According to the given problem, dart board is of radius 8.5 units.

Therefore, total area = $\pi \times (8.5)^2$

 $= 72.25 \times \pi$.

Continued...

To score 4 points:

Area in which player will score 4 points: r1= 5, r2= 7.

Area enclosed = $\pi \times (7)^2 - \pi \times (5)^2 = 24 \times \pi$

 \Rightarrow Probability that player will score 4 points = 24 × π / 72.25× π

= 0.3321

Q5.

A letter is selected from the letters of the word "ABCDEFGHI".

Q. What is the probability that the letter selected is not a vowel?

Enter the answer up to 2 decimals accuracy.

The number of letters in a word "ABCDEFGHI" is 9.

The number of vowels in a word are 3, A, E and I.

So, the number of consonants in a word "ABCDEFGHI" is 6.

⇒ The probability that selected letter is not a vowel is 6/9

Thank You