How to participate?
joinpd.com
code: see above

Statistics for Data Science-I

Week 6 Solve with Instructor (graded)

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joinpd.com
code: see above

Statistics I: Week 6 Solve with Instructor

- Keep a notebook and pen ready for solving problems

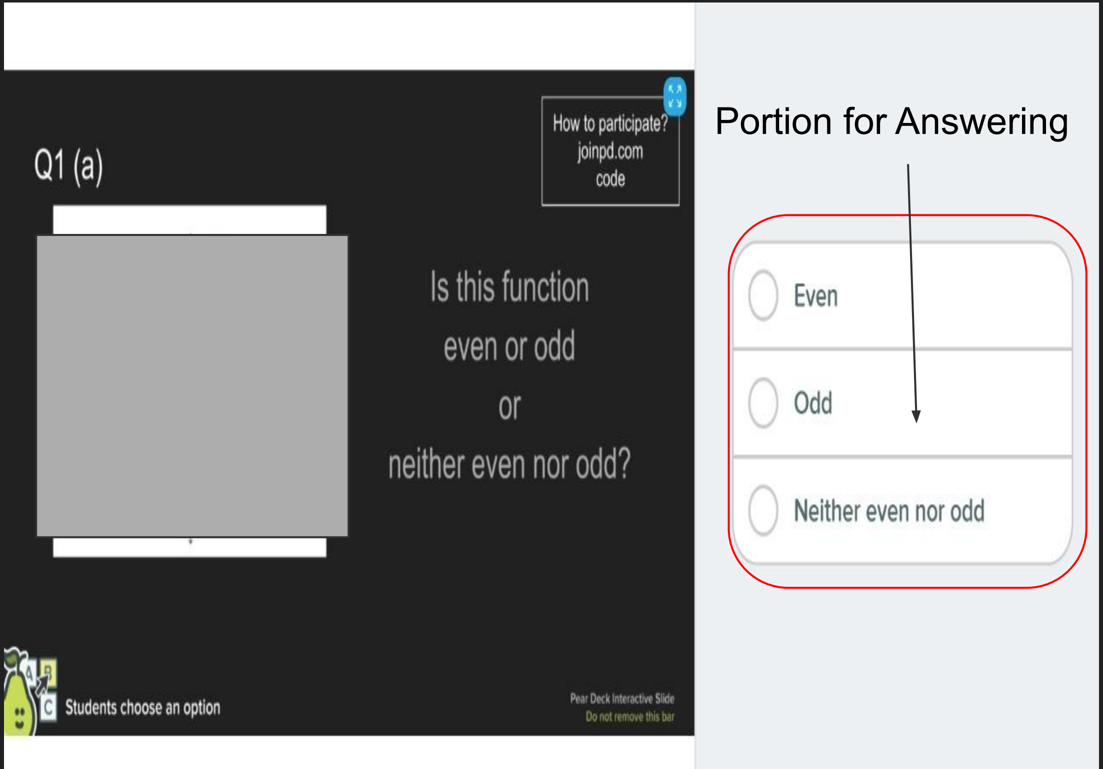
- How to join?
  - Audio/screenshare on webex - click on link sent to you
    - Doubts? Use webex chat. Do not answer questions on webex chat.
  - Join on pear deck - joinpd.com (enter code seen on top right)
    - Answer questions only here

- 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

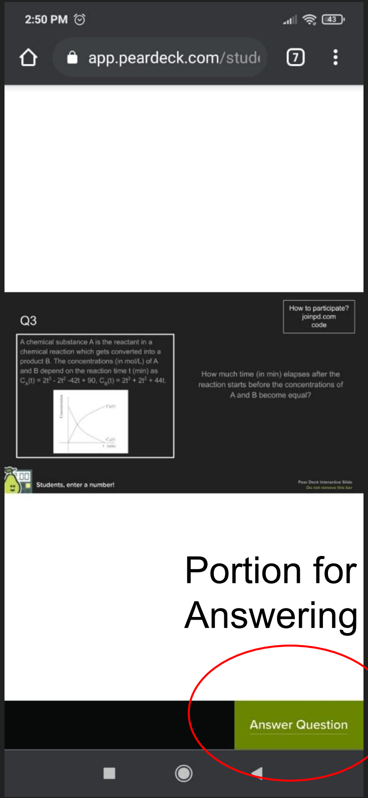
Example Screenshots

How to participate?
joinpd.com
code: see above

Laptop/Desktop



Mobile



Prelude 1 to Q1

A play needs four protagonists (two men each playing different role, a woman, and a girl), two antagonists (a man and a woman), and three supporting roles (a man, a girl, and a boy). Six men, six women, three boys, and four girls attended the auditions.

The number of ways the roles that require men can be cast is:

Solution:

Number of men who attended the audition = 6

Number of ways men can be cast for the roles = $6P4=360$

Prelude 2 to Q1

A play needs four protagonists (two men each playing different role, a woman, and a girl), two antagonists (a man and a woman), and three supporting roles (a man, a girl, and a boy). Six men, six women, three boys, and four girls attended the auditions.

The number of ways the roles that require women can be cast is:

Solution:

Number of women who attended the audition = 6

Number of ways women can be cast for the roles = $^{6}P_{2}=30$

Q1

A play needs four protagonists (two men each playing different role, a woman, and a girl), two antagonists (a man and a woman), and three supporting roles (a man, a girl, and a boy). Six men, six women, three boys, and four girls attended the auditions.

The number of ways the roles can be cast is:

Solution:

Number of boys who attended the audition = 3

Number of girls who attended the audition = 4

Number of ways men can be cast for the role= 6P4=360

Number of ways women can be cast for the role= 6P2=30

Number of ways boys can be cast for the role = 3P1=3

Number of ways girls can be cast for the role= 4P2=12

Total number of ways= 360*30*3*12=388800 ways

Q2

The number of distinct sequences we can make using the letter `J' four times and the letter `K' four times (eg. JJJJKKKK, JJKKJJKK, etc.) is

Students, enter a number!

Solution:

The sequence is of length eight. We can choose 4 places out of 8 for J and the remaining 4 places for K.

Therefore, number of distinct sequences possible = $8!/(4!*4!)=70$

Q3

The number of ways to order (in line) the first 22 letters of English alphabet so that no two vowels (a, e, i, o, and u) occur consecutively is

Solution

Number of letters in the first 22 alphabets that are not vowels = 22-5=17

Number of ways these 17 letters can be ordered = 17!

Between the 17 letters that are ordered, there will be 18 places which are to be occupied by 5 vowels.

Number of ways 5 vowels are ordered in 18 places = 18P5=18!/13!

Therefore, the total number of ways to order the first 22 letters of the alphabets so that no two vowels occur together = 17!*18!/13!

Q4

A coin toss bet is placed between two friends such that the person who wins six tosses first is the winner. A game is played until one of the friends wins, they stop the game if one of the friend wins six tosses.

What is the total number of possible ways in which the bet can play out?

Solution

Case 1) Only 6 matches played to get winner: It means one of friend won all the 6 tosses. It could happen in two ways (either 1st friend will win or 2nd friend will win all)

Case 2) Only 7 matches played to get winner: It means winning friend can lose one game out of the first 6 games. It could be **WWWLWWW.** It could happen in 6 ways. So, total ways = 6*2 = 12 (since any of two friends can win).

Case 3) Only 8 matches played to get winner: It means winning friend can lose two games out of the first 7 games. It could be **WWLWLWWW.** It could happen in 7C2 =21. So, total ways = 21*2=42 (since any of two friends can win).

Solution

<u>Case 4)</u> Only 9 matches played to get winner: It means winning friend can lose three games out of the first 8 games. It could be **WWLWLWWW.** It could happen in 8C3 =56. So, total ways = 56*2=112 (since any of two friends can win).

<u>Case 5)</u> Only 10 matches played to get winner: It means winning friend can lose four game out of the first 9 games. It could be **LLLWWWLWWW.** It could happen in 9C4 ways =126. So, total ways = 126*2 (since any of two friends can win).

<u>Case 6)</u> 11 matches played to get winner: It means winning friend can lose five game out of the first 10 games. It could be **WLLLLWWLWWW.** It could happen in 10C5=252 ways. So, total ways = 252*2 (since any of two friends can win).

Therefore total ways game can end is (1+6+21+56+126+252)*2=924 ways

Q5

How many numbers from 0 to 1000 have exactly one digit equals to 5?

Solution

All the numbers between 0 and 1000 have 3 places to be filled _ _ _.

By varying the numbers in this 3 digits we get all the possible cases.

Ex: To get 2 digit number 0_ _, we need to make first digit as zero,

For single digit numbers 00_, we need to make first two digits as zero.

So, for the number to have exactly 1 digit 5, we need to fill 5 in one of these places. It can be done in 3c1=3 ways, either 5_ _ or _5_ or _ _5

The remaining two places can be filled by 9 numbers (0,1,2,3,4,6,7,8,9) in 9^2= 81 ways.

Solution

Therefore, the total numbers that have exactly one digit as 5 in between 0 and 1000 is 3*81=243 ways.

Thank You