How to participate?
joinpd.com
code: see above

Statistics for Data Science-I

Week 5 Solve with Instructor (graded)

How to participate?
joinpd.com
code: see above

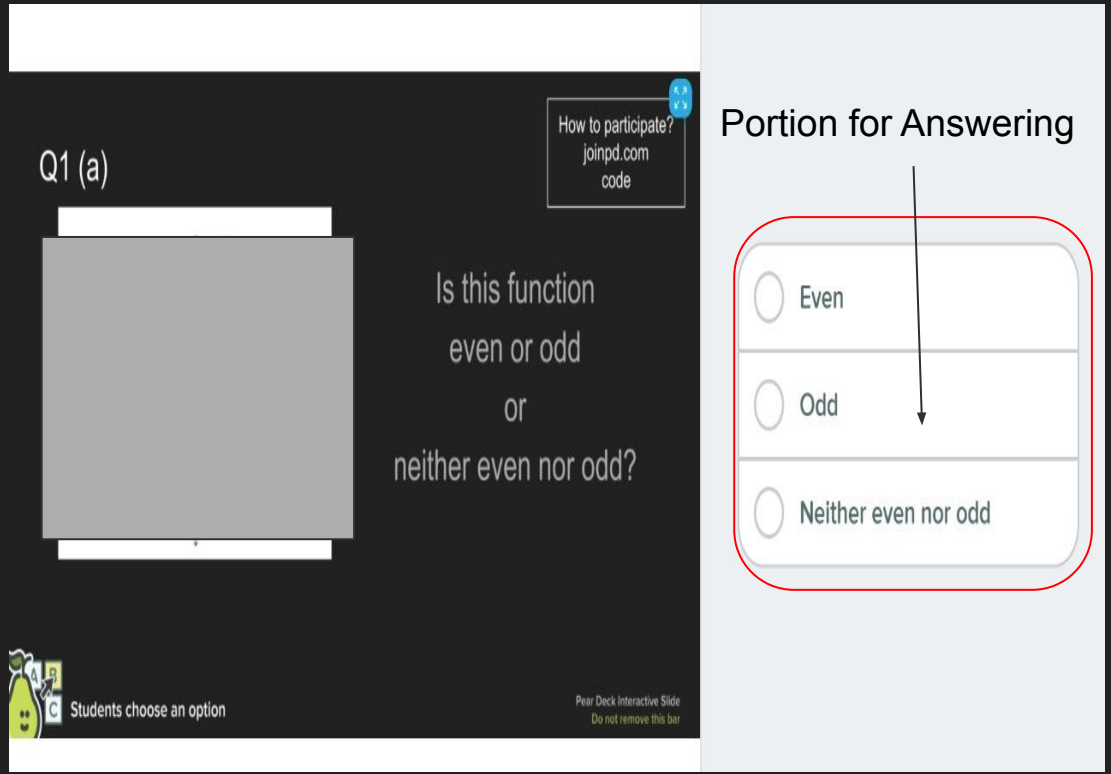
Statistics I: Week 3 Solve with Instructor

- 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

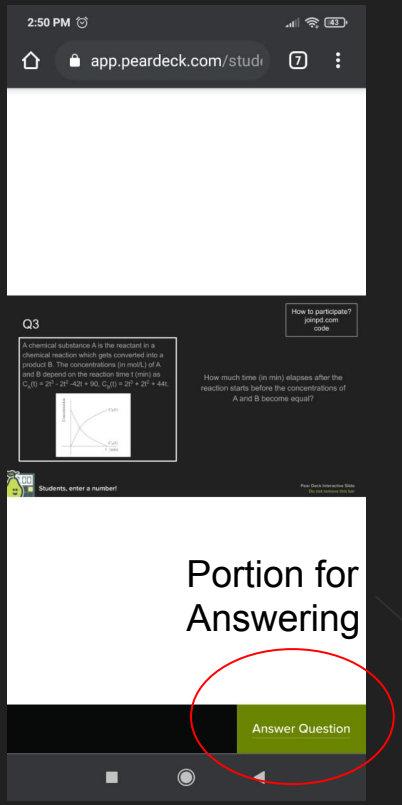
Example Screenshots

How to participate?
joinpd.com
code: see above

Laptop/Desktop



Mobile



Prelude 1 to Q1

There are 10 shirts, 15 pants, and 20 kurtas. Raj has a gift voucher with which he can buy 1 item from above categories.

What are the total number of different ways in which Raj can use the gift voucher?

Students, enter a number!

Solution:

Raj has to choose one item from the given categories.

The number of ways he can select a shirt = 10

The number of ways he can select a pant = 15

The number of ways he can select a kurta = 20

Raj can select either a shirt or a pant or a kurta.

Therefore, the total number of ways of selecting an item = 10 + 15 + 20 = 45

Prelude 2 to Q1

There are 10 shirts, 15 pants, and 20 kurtas. Raj has a gift voucher with which he can buy 2 items (these 2 items should be of different category) from above categories.

What are the total number of different ways in which Raj can use the gift voucher?

Students, enter a number!

Solution:

Raj has to choose two items (these 2 items should be of different category).

The number of ways he can select a shirt and a pant = 10 x 15 = 150

The number of ways he can select a shirt and a kurta = 10 x 20 = 200

The number of ways he can select a pant and a kurta = 15 x 20 = 300

Therefore, the total number of ways of selecting an item = 150 + 200 + 300 = 650

Q1

There are 10 shirts, 15 pants, and 20 kurtas. Raj has a gift voucher with which he can buy item or 2 items (these 2 items should be of different category) from above categories.

What are the total number of different ways in which Raj can use the gift voucher?

Students, enter a number!

Solution:

Raj can buy either one item or two items((these 2 items should be of different category).

The total number of ways of buying 1 item = 45

The total number of ways of buying 2 items = 650

Therefore, the total number of ways to buy either one item or two items = 45 + 650 = 695

Q2

There are 5 hats numbered 1 to 5. These 5 hats should be distributed to 6 people with each person getting a maximum of one hat.

What are the total number of ways in which the hats can be distributed to 6 persons?

Solution:

Consider 6 persons as P1, P2, P3, P4, P5 and P6.

There are total 5 hats numbered from 1 to 5 and each person will get maximum of 1 hat.

Firstly five persons are chosen from total of 6 persons in following ways:

P1, P2, P3, P4, P5

P1, P2, P3, P4, P6

P2, P3, P4, P5, P6

P1, P3, P4, P5, P6

P1, P2, P3, P5, P6

P2, P3, P4, P5, P6

Continued…..

Now, 5 hats are arranged in 5 x 4 x 3 x 2 x 1 = 5! = 120 ways.

Therefore, total number of ways = 6 x 120 = 720

Q3

In a multiple select question, each question containing 5 options, more than one option could be correct.

What are the total number possible ways in which a student can select the answer to the multiple select question? Assume that student selects at least one option.

Solution:

For a multiple select question, there are 5 options and a student need to select at least one option.

Consider options as O1, O2, O3, O4, O5

Number of ways of selecting one option = O1, O2, O3, O4, O5 = 5

Number of ways of selecting two options = (O1, O2), (O1, O3), (O1, O4)....(O2, O3), (O2, O4).....(O4, O5) = 10

Number of ways of selecting three options = (O1, O2, O3), (O1, O3, O4), (O1, O4, O5)....(O2, O3, O4), (O2, O4, O5).....(O3,O4, O5) = 10

Continued….

Number of ways of selecting four options = (O1, O2, O3, O4), (O1, O3, O4, O5), (O1, O3, O4, O5)....(O2, O3, O4, O5) = 5

Number of ways of selecting five options = (O1, O2, O3, O4, O5) = 1

Therefore, total number of ways = 5 + 10 + 10 + 5 +1 =31

Q4

Find the ratio of the number of three digit numbers (all digits being even) whose digits either increase or decrease from left to right to the number of three digit numbers (all digits being odd) whose digits either increase or decrease from right to left is

Students, enter a number!

Solution:

Even digits are five {0, 2, 4, 6, 8}.

The required number when digits increase from left to right while taking {2,4,6,8} only are {246, 248, 268, 468}

The required number when digits decrease from left to right while taking {0,2,4,6,8} only are {864, 862, 642, 842, 420, 620, 820, 640, 840, 860 }

So overall we have 14 different numbers that can be formed of three digits whose digits either increase or decrease from left to right.

Odd digits are {1, 3, 5, 7, 9}

The required number when digits increase from right to left while taking {1, 3, 5, 7, 9} only are {135, 137, 139, 157, 159, 179, 357, 359, 379, 579}

The required number when digits decrease from right to left while taking {1, 3, 5, 7, 9} only are {531, 731, 931, 751, 951, 971, 753, 953, 973, 975}

So overall we have 20 different numbers that can be formed of three digits whose digits either increase or decrease from right to left.

Hence there ratio are 14 /20 = 7 /10 = 0.7.

Q 5

How many numbers between 0 to 1 billion can be formed using 0, 1, 2 digits.

Solutions

We need to count the numbers lies between 0 to 1000000000. Hence we need to exclude 0 and 1000000000. As we need to exclude 1000000000, the largest 9 digit number would be now 999999999. So now we need to count all numbers that can be formed from 1 to 999999999 using 0, 1, 2 digits only.

So, the maximum number of digits that can be filled with 0, 1, 2 are 9.

For unit’s place, any number from 0, 1, 2 can be selected. similarly for ten’s place any number from 0, 1, 2 can be selected. Likewise for all 9 digits any number from 0, 1, 2 can be selected. So in total 3^9 different numbers can be made using 0, 1, 2 but we need to exclude one number when all the 9 digits will be occupied by 0. So we need to subtract one from 3^9 . Hence 3^9 − 1 is correct.

Q6

How many numbers between 0 to 1 billion can be formed using 1, 2, 3 digits.

Q7.

Suppose that number of runs scored off a delivery is uniform in {1, 2, 3, 4, 5, 6} independent of what happens in other deliveries. A batsman played 3 deliveries then find the number of possible outcomes such that he hit 3 runs of at least 1 delivery.

Runs scored off a delivery is uniform in {1, 2, 3, 4, 5, 6}. We need to find the number of possible outcomes such that the batsman hit 2 runs of single ball at least once off those 3 deliveries.

The different cases for this to happen are:

Case 1: Batsman hit 3 runs only once of those 3 deliveries , So he will hit 3 run of one ball but he can hit {1,3,4,5,6} of rest of those 2 balls.

So in this case, he can hit 3 runs off the first ball then he can hit any runs in {1, 2, 4, 5, 6} off second ball in five different ways and also he can hit any runs in {1, 2, 4, 5, 6} off third ball in five different ways.

So in total 5 × 5 that is 25 ways in which he can score runs considering he hit 2 runs off the first ball and anything from {1,3,4,5,6} off second and third ball.

Similarly he can score 3 runs off second ball and can score anything from {1,3,4,5,6} off first and third ball so here also he can score runs in 5 × 5 ways.

In the same way he can score 3 runs off third ball and can score anything from {1,3,4,5,6} off first and second ball so here also he can score runs in 5 × 5 ways.

In total, he can score runs in 25 + 25 + 25 ways considering he score 3 runs only once off those 3 deliveries he played.

Case 2: Batsman hit two time 3 runs off those 3 deliveries, so he can hit anything in {1,3,4,5,6} from the remaining one ball.

He can score 3 runs off first and second deliveries but can hit anything from {1,3,4,5,6} off the last ball. Hence he can score in 5 different ways as he can hit anything in {1,3,4,5,6} off the last ball.

Similarly, he can score 3 runs off second and third ball but can hit anything in {1,3,4,5,6} off the first ball. Hence he can score in 5 different ways as he can hit anything from {1,3,4,5,6} off the first ball

In the same way he can score 3 runs off first and third ball but can hit anything from {1,3,4,5,6} off the second ball.

Hence he can score in 5 different ways as he can hit anything from {1,2,4,5,6} off the second ball. So in total, he can can score 3 runs twice in 5 + 5 + 5 different ways.

Case 3: Batsman hit 3 runs three times off all those 3 balls

He can score 3 runs three times off all those 3 balls in only one way.

Hence in total he can score runs considering he scores at least 3 runs off all those three deliveries he faced are 25 + 25 + 25 + 5 + 5 + 5 + 1 that is 91

Q7

Rohit wants to set a 4 digit password for his phone. Out of those 4 digits, the first 2 digits are alphabetical and the remaining 2 digits are numeric. Both upper case and lower case alphabets can be used in the password. Repetition of alphabets is allowed while repetition of numbers is not allowed in password. What are the total number of ways in which Rohit can set the password for his phone?

Password consist of 4 digits out of which first 2 digits can be alphabets only and repetition is allowed so we have 52 × 52 ways of giving input for these two digits. (As we have 26 capital and 26 small alphabets so in total we have 52 alphabets to set the password.)

Similarly the number of ways for the last two digits will be 10×9 = 90. (For third digit we have 10 numbers (ways) that we can use to set the password. Since the repetition is not allowed, for the fourth digit we have only nine numbers to use to set the password as we have already used one number for third digit.)

Hence, by Multiplication rule of counting, the number of ways in which the person can set the password is 52 × 52 × 10 × 9 that is 52*52 × 10 × 9.

Q8.

Total number of ways in which four boys and four girls can be seated around a round table, so that no two girls sit together, is equal to

The boys can be arrange in 3! ways around the circle. They form 4 gaps in which girls will occupy difference gaps. So, the girls can now be arrange in 4! ways. So, the total number of ways = 3! 4! = 4 × (3!)*3!

Thank You