

Week 3 Graded

Questions (1 & 2)

Statement

The following pseudocode is executed using the “Words” dataset.

```
1  P = 0, Q = 0
2  while(Table 1 has more rows){
3      Read the first row X in Table 1
4      if(X.LetterCount % 2 == 0){
5          P = P + 1
6      }
7      else{
8          if(X.PartOfSpeech == "Adverb"){
9              Q = Q + 1
10         }
11     }
12     Move X to Table 2
13 }
```

Question 1 [4 Marks]

Statement

What will **P** represent at the end of the execution?(MCQ)

Options

(a)

Number of words with an even letter count

(b)

Number of words with an odd letter count

(c)

Number of adverbs with an even letter count

(d)

Number of adverbs with an odd letter count

Answer

(a)

Question 2 [4 Marks]

Statement

What will **Q** represent at the end of execution?(MCQ)

Options

(a)

Number of adverbs with an even letter count

(b)

Number of adverbs with an odd letter count

(c)

Number of words with any letter count

(d)

Number of adverbs with any letter count

Answer

(b)

Solution

The given pseudocode is executed on "Words" dataset.

- Variables **P**, and **Q** are initialized with 0.
- Line 4: Condition checks if the word in current row has letter count divisible by 2. If so then **P** will be incremented. This refers that **P** represents the number of words with an even letter count.
- Line 7: else is being used, this means if the condition in line 4 is not satisfied then else block will be executed. Which refers that the letter count of the word is not divisible by 2.
- If the condition in line 8 is True, this means the word is an adverb. If so then **Q** gets incremented. Therefore, **Q** stores the number of adverbs with an odd letter count.

Question 3 [4 Marks]

Statement

The following pseudocode is executed using the “Scores” dataset.(MCQ)

```
1  E = True
2  while(Table 1 has more rows){
3      Read the first row X in Table 1
4      if(X.Gender == 'F'){
5          if(X.Physics < 60 or X.Chemistry < 60 or X.Maths < 60){
6              E = False
7          }
8      }
9      Move X to Table 2
10 }
```

At the end of the execution, **E** will be True if

Options

(a)

All female students have scores greater than or equal to 60 in either Physics, Chemistry or Maths

(b)

All female students have scores less than 60 in either Physics, Chemistry or Maths

(c)

There is at least one female student with scores less than 60 in Physics, Chemistry or Maths

(d)

All female students have scores greater than or equal to 60 in Physics, Chemistry and Maths

Answer

(d)

Solution

E is initialized with True. It will be updated to False when both the **if** conditions are True. So if any one of the conditions is False, then the value of **E** will remain True.

For a row there are two possibilities:

1. If the row belongs to a **male**, then **E** will remain True. But as we can see in the question, all the options given to us are regarding female students so we can assume that we are talking about female students here.

2. If the row belongs to a **female**, to keep **E** True, the condition in nested "if" should be False. For a female student, if the condition in nested "if" is False always, then it means there does not exist even a single female student who is having scores less than 60 in either Physics, Chemistry or Maths. Therefore, to keep **E** True, all the female students must have scores greater than or equal to 60 in all subjects.

Thus the correct option is (d).

Question 4 [4 Marks]

Statement

The following pseudocode is executed using the “Shopping Bills” dataset. Procedure **checkShoppingBills** accepts a card **Y** and returns True if the minimum total bill amount of shop is greater than the average total bill amount of shop from where the card **Y** is generated otherwise returns False. Choose the correct code fragments to complete the procedure. It is a Multiple Select Question (MSQ). Note : **MAX_VALUE** represent the maximum bill amount of shop **Y**.

```
1 Procedure checkShoppingBills(Y)
2   count = 0, totalAmount = 0, minAmount = MAX_VALUE
3   while(Pile 1 has more cards){
4     Read the top card X from Pile 1
5     if(X.ShopName == Y.ShopName){
6       count = count + 1
7       totalAmount = totalAmount + X.TotalBillAmount
8       if(X.TotalBillAmount < minAmount){
9         minAmount = X.TotalBillAmount
10      }
11    }
12    Move card X to Pile 2
13  }
14  averageAmount = totalAmount / count
15  *****
16  * Fill the code          *
17  *****
18 End checkShoppingBills
```

Options

(a)

```
1 if(minAmount >= averageAmount){
2   return(True)
3 }
4 return(False)
```

(b)

```
1 if(Y.TotalBillAmount > minAmount){
2   return(True)
3 }
4 return(False)
```

(c)

```
1  if(Y.TotalBillAmount >= minAmount){
2      return(True)
3  }
4  else{
5      return(False)
6  }
```

(d)

```
1  if(minAmount > averageAmount){
2      return(True)
3  }
4  return(False)
```

Answer

(d)

Solution

If a card (let us say **Y**) is passed as the parameter to the procedure **checkShoppingBills** . Let the card is generated from a shop XYZ, then the procedure will return True minimum total bill amount is greater than the average total bill amount generated from the shop XYZ.

To do so, first we need to collect all the cards which are generated from the same shop i.e., XYZ and then find its average of total bill amount.

We can check that if the card **X** is from the same shop or not by using the condition **X.ShopName == Y.ShopName**. This is what being done in the Line 5.

Line 6: Variable **count** stores the number of cards from the same shop.

Line 7: Total bill amount of every card which are from same shop is being added into variable **totalAmount** which was initialized as 0.

Line 8: Will check if the minimum amount is greater than total bill amount of shop XYZ.If the condition is satisfied then it will update **minAmount** variable which was initialized as **MAX_VALUE**.

Line 14: **avg** stores the average of total bill amount generated from the same shop.

Now we just need to check if the minimum total bill amount of shop **Y** is greater than average or not.

Option A: The "if condition" checks whether the minimum total bill amount is greater than or equal to average. Thus option A is **Wrong**.

Option B: The "if condition" checks for card Y whether the total bill amount is greater than minimum total bill amount. Thus option B is **Wrong**.

Option C- The "if condition" checks for card Y whether the total bill amount is greater than or equal to minimum total bill amount. Thus option C is **Wrong**.

Option D- The "if condition" checks whether the minimum total bill amount is greater than average. Thus option D is **Correct**.

So the Correct option is (d).

Question 5 [4 Marks]

Statement

The following pseudocode is executed using the "Scores" dataset. What will **A** represent at the end of the execution?(MCQ)

```
1  A = 0
2  while(Table 1 has more rows){
3      Read the first row X in Table 1
4      B = True
5      if(X.Physics >= 60 and X.Chemistry >= 60 and X.Mathematics >= 60){
6          B = False
7      }
8      if(B){
9          A = A + 1
10     }
11     Move X to Table 2
12 }
```

Options

(a)

Number of students scored above 60 in all three subjects

(b)

Number of students scored below 60 in at least any one subject

(c)

A will always be 0

(d)

Number of students scored exactly 60 in all three subjects

Answer

(b)

Solution

The value of **B** will become False if all of the below conditions are True :-

1. If X's Physics marks are greater than or equal to 60.
2. If X's Mathematics marks are greater than or equal to 60.
3. If X's Chemistry marks are greater than or equal to 60.

To keep **B** True, student shouldn't score greater than or equal to 60 in atleast any one of the subject. Therefore **A** represents the number of students failing in at least one subject with a score below 60.

So the correct option is (b).

Question 6 [4 Marks]

Statement

The following pseudocode is executed using the “Scores” dataset. At the end of the execution, variable **Count** captures the number of students whose total marks are more than the average (of total marks) of entire dataset but have scored below the subject average in any two subjects. Assume that the variable **AvgT** holds the value of the average total marks. Similarly, the variables **AvgP**, **AvgC** and **AvgM** hold the value of the average marks of Physics, Chemistry and Mathematics respectively. Choose the correct code fragment to complete the pseudocode. It is a Multiple Select Question(MSQ).

```
1  Count = 0
2  while(Table 1 has more rows){
3      Read the first row X from Table 1
4      A = False, B = False, C = False, D = False
5      if(X.Total > AvgT){
6          A = True
7      }
8      if(X.Mathematics < AvgM and X.Physics < AvgP){
9          B = True
10     }
11     if(X.Physics < AvgP and X.Chemistry < AvgC){
12         C = True
13     }
14     if(X.Chemistry < AvgC and X.Mathematics < AvgM){
15         D = True
16     }
17     *****
18     **      Fill the code      **
19     *****
20     Move X to Table 2
21 }
```

Options

(a)

```
1  if(A and (B or C or D)){
2      Count = Count + 1
3  }
```

(b)

```
1  if(A and (B and C) and (C and D) and (D and B)){
2      Count = Count + 1
3  }
```

(c)

```
1  if(A or (B and C) or (C and D) or (D and B)){
2      Count = Count + 1
3  }
```

(d)

```
1  if(A or (B or C) or (C or D) or (D or B)){
2      Count = Count + 1
3  }
```

Answer

(a)

Solution

Let us first understand the meaning of each variable using the given pseudocode:

AvgT: Average total marks

AvgM: Average Mathematics marks

AvgP: Average Physics marks

AvgC: Average Chemistry marks

A: Initially False but it will become True if Total > **AvgT**

B: Initially False but it will become True if MathematicsMarks < **AvgM** and PhysicsMarks < **AvgP**

C: Initially False but it will become True if PhysicsMarks < **AvgP** and ChemistryMarks < **AvgC**

D: Initially False but it will become True if ChemistryMarks < **AvgC** and MathematicsMarks < **AvgM**

Now, as per the question statement **Count** will be incremented only if **A** is True **and** at least one among **B**, **C** and **D** are True.

Here, in condition for if statement, we can't say **A** "or" other as we have to satisfy both 1 and 2 conditions mentioned above.

So, option (c) and (d) are incorrect.

Option a: A and (B or C or D) --

- Let **A** is True
- Let **B** is True, **C** is True and **D** is False
- (B or C) = True, (C or D) = True, and (D or B) = True
- Overall = True
- This will be True if any one variables are True among B, C, D.

Option b: A and (B and C) and (C and D) and (D and B) , it's checking for all the variables to be true

Therefore, the correct option is (a).

Question 7 [4 Marks]

Statement

The following pseudocode is executed using the "Scores" dataset.(MCQ)

```
1  SumA = 0, SumB = 0
2  CountA = 0, CountB = 0
3  A = 0, J = 0, K = 0
4
5  while(Pile 1 has more cards){
6      Read the top card X from Pile 1
7      if(X.CityTown == "Vellore"){
8          SumA = SumA + X.Total
9          CountA = CountA + 1
10     }
11     if(X.CityTown == "Chennai"){
12         SumB = SumB + X.Total
13         CountB = CountB + 1
14     }
15     Move card X to Pile 2
16 }
17
18 J = SumA / CountA
19 K = SumB / CountB
20
21 while(Pile 2 has more cards){
22     Read the top card X from Pile 2
23     if(X.CityTown == "Madurai"){
24         if(X.Total > J){
25             if(X.Total < K){
26                 A = A + 1
27             }
28         }
29     }
30     Move card X to Pile 1
31 }
```

At the end of the execution, **A** represents the number of students from Madurai having total marks.....

Options

(a)

greater than the average marks of students

(b)

greater than the average marks of students from Vellore and Chennai

(c)

greater than the average marks of students from Vellore but less than that of Chennai

(d)

greater than the average marks of students from Chennai but less than that of Vellore

Answer

(c)

Solution

In the first while loop we are computing values of **SumA**, **CountA**, **SumB** and **CountB**. Let us understand what these variable represent in this pseudocode:

SumA: Sum of total marks of students from Vellore

CountA: Number of students from Vellore

SumB: Sum of total marks of students from Chennai

CountB: Number of students from Chennai

After the first while loop we are calculating values of **J** and **K** which represents average marks of students from Vellore and Chennai respectively.

Now in the second while loop,

first, the card is being checked to find if it belongs to the student from "Vellore" or not.

- If True, then Total marks is being checked if it is greater than **J** or not. If so, then Total marks is being checked if it is less than **K** or not. If this is also True then, **A** is being incremented.

So, basically, in the end, **A** represents the number of students from Madurai having total marks "greater than the average marks of students from Vellore but less than that of Chennai".

Hence, option **(c)** is correct.

Question 8 [4 Marks]

Statement

The following pseudocode is executed using the "Scores" dataset. At the end of the execution, **A** captures the number of female students who are below average in at least one subject. Assume that the variables **M**, **P** and **C** hold the average marks of the subjects Mathematics, Physics and Chemistry respectively. The pseudocode may have mistakes. Identify all such mistakes (if any). Assume that all statements not listed in the options below are free of errors. It is a Multiple Select Question (MSQ).

```
1  1. A = 0
2  2. while(Table 1 has more rows){
3  3.     B = True
4  4.     Read the first row x from Table 1
5  5.     if(x.Gender == 'F'){
6  6.         if(x.Mathematics < M){
7  7.             B = False
8  8.         }
9  9.         if(x.Physics < P){
10 10.             B = True
11 11.         }
12 12.         if(x.Chemistry < C){
13 13.             B = False
14 14.         }
15 15.     }
16 16.     if(B){
17 17.         A = A + 1
18 18.     }
19 19.     Move x to Table 2
20 20. }
```

Options

(a)

Line 1: Incorrect initialization of **A**

(b)

Line 3: Incorrect initialization of **B**

(c)

Line 7: Incorrect Update of **B**

(d)

Line 13: Incorrect Update of **B**

(e)

No error in the code

Answer

(b), (c), (d)

Solution

The variable **A** counts the number of female students who have scored less than the subject average in at least one subject (either in one subject or in more than one subjects).

- Line 16: A is being incremented whenever **B** is True. This means **B** should be True when the card belongs to a female student and the subject marks of at least one subject is less than the average of that subject.
- Line 5 - Line 15: It is totally clear that B should be True in lines 7 and 13. **Therefore options c and d are correct.**
- Line 3: As **A** gets incremented only if **B** is True, then **B** should be initialized with False.

Question 9 [4 Marks]

Statement

The following pseudocode is executed using the “Words” dataset. What does **A** represent?(MCQ)

```
1  A = 0
2  while(Pile 1 has more cards){
3      Read the top card X from Pile 1
4      A = A + isSpecialWord(X)
5      if(X.word ends with full stop){
6          A = 0
7      }
8      Move X to Pile 2
9  }
10 Procedure isSpecialWord(X)
11     if(X.word == "the"){
12         return(1)
13     }
14     return(0)
15 End isSpecialWord
```

Options

(a)

Count the occurrence of word "the"

(b)

Count the occurrence of sentence starting with "the"

(c)

Count the occurrence of sentence ending with "the"

(d)

Count the occurrence of "the" in every sentence

Answer

(d)

Solution

As we can see in line 4, **A** is getting incremented if procedure **isSpecialWord()** returns 1.

In procedure **isSpecialWord()**, it says if the word is "the" then return 1.

In line 5, it checks whether the word ends with full stop, if yes reset **A** to 0. That means, **A** is looking for "the" in every sentence.

Therefore, **A** is counting the occurrence of "the" in every sentence. Hence, Option **(d)** is correct.

Question 10 [4 Marks]

Statement

The following pseudocode is executed using the “Words” dataset. What will **A** represent at the end of the execution?(MCQ)

```
1  SumT = 0, CountT = 0, B = 0
2  while(Table 1 has more rows){
3      Read the first row X in Table 1
4      CountT = CountT + 1
5      SumT = SumT + X.LetterCount
6      Move X to Table 2
7  }
8  B = SumT / CountT
9  A = 0
10 while(Table 2 has more rows){
11     Read the first row X in Table 2
12     if(X.word ends with a comma){
13         if(X.LetterCount > B){
14             A = A + 1
15         }
16     }
17     Move X to Table 1
18 }
```

Options

(a)

Number of words that end with a comma.

(b)

Number of words that end with a comma and have a letter count greater than ratio of number of words to sum of letter count.

(c)

Number of words that end with a comma and have a letter count less than or equal to the average letter count of dataset.

(d)

Number of words that end with a comma and have a letter count greater than the average letter count of dataset.

Answer

(d)

Solution

In first while loop,

CountT is keeping command of "count of cards (or words)" of dataset. And **SumT** is keeping command of "sum of letter count of words" of whole dataset.

Then we can see, $B = \text{SumT} / \text{CountT}$, means "the average letter count of dataset."

Now, in second while loop,

If conditional says, that word ends with comma then A will get incremented by 1 if **X.LetterCount** > **B**. That means, **A** will maintain the number of words that end with a comma and have a letter count greater than the average letter count of dataset.

Hence, option **(d)** is correct.