COMPUTATIONAL THINKING
Week - 3

Graded Assignment

1. In the "Paragraph words" dataset, the procedure **CountLongNouns** counts the number of nouns that are longer than the average word length. Assume that the variable **Avg** holds the value of average word length. Choose the correct choice to complete the procedure. [3 Marks]

```
Procedure CountLongNouns()
while (Pile 1 has more rows) {
    Read the top card X from Pile 1
        **********************
        *      Fill the code      *
        **********************
    }
    Move X to Pile 2
}
```

a.
```
if (X.LetterCount > Avg) {
    Count = Count + 1
}
```

b.
```
if (X.PartOfSpeech == "Noun") {
    Count = Count + 1
}
```

c.
```
if (X.LetterCount > Avg or X.PartOfSpeech == "Noun") {
    Count = Count + 1
}
```

d.
```
if (X.LetterCount > Avg and X.PartOfSpeech == "Noun") {
    Count = Count + 1
}
```

e. None of the above

2. The following pseudocode is executed using the "Scores" dataset. What will be the value of the variable **Z** at the end of the execution? [Note: Consider only two decimal places in all division operations.] [4 Marks]

```
SumT = 0, SumM = 0, SumP = 0, SumC = 0
Count = 0
while (Pile 1 has more cards) {
    Read the top card X from Pile 1
    SumT = SumT + X.Total
    SumM = SumM + X.Mathematics
    SumP = SumP + X.Physics
    SumC = SumC + X.Chemistry
    Count = Count + 1
    Move X to Pile 2
}
A = SumT / Count
B = SumM / Count
C = SumP / Count
D = SumC / Count
Z = 0
if ((B + C + D) − A ≤ -1) {
    Z = -1
}
if ((B + C + D) − A ≥ 1) {
    Z = 1
}
```

a. -1

b. 0

c. +1

d. None of the above

3. The following pseudocode is executed using the "Scores" table. At the end of the execution, the variable **CountBA** captures the number of students with total marks less than average total marks and below average in exactly one subject. Assume that the variable **AvgT** holds the value of average total marks. Similarly, the variables **AvgP**, **AvgC** and **AvgM** hold the value of average marks of Physics, Chemistry and Mathematics respectively. Choose the correct choice to complete the pseudocode. [3 Marks]

```
CountBA = 0
while (Table 1 has more rows) {
    Read the first row X from Table 1
    SubC = 0
    if (X.Total < AvgT) {
        if (X.Mathematics < AvgM) {
            SubC = SubC + 1
        }
        if (X.Physics < AvgP) {
            SubC = SubC + 1
        }
        if (X.Chemistry < AvgC) {
            SubC = SubC + 1
        }
        **********************
        *      Fill the code      *
        **********************
    }
    Move X to Table 2
}
```

a.
```
if (SubC ≤ 1) {
    CountBA = CountBA + 1
}
```

b.
```
if (SubC ≤ 1) {
    CountBA = 1
}
```

c.
```
if (SubC == 1) {
    CountBA = 1
}
```

d. ✓
```
if (SubC == 1) {
    CountBA = CountBA + 1
}
```

4. The following pseudocode is executed using the "Shopping bills" dataset. What will the values of the variables **A** and **B** represent at the end of the execution? [4 Marks]

```
SumSV = 0, SumBB = 0
CountSV = 0, CountBB = 0
while (Pile 1 has more cards) {
    Read the top card X from Pile 1
    if (X.ShopName == "SV Stores") {
        SumSV = SumSV + X.TotalBillAmount
        CountSV = CountSV + 1
    }
    if (X.ShopName == "Big Bazaar") {
        SumBB = SumBB + X.TotalBillAmount
        CountBB = CountBB + 1
    }
    Move X to Pile 2
}
MSV = SumSV / CountSV
MBB = SumBB / CountBB
A = 0, B = 0
while (Pile 2 has more cards) {
    Read the top card X from Pile 2
    if (X.ShopName == "SV Stores" and X.TotalBillAmount < MSV) {
        A = A + 1
    }
    if (X.ShopName == "Big Bazaar" and X.TotalBillAmount > MBB) {
        B = B + 1
    }
    Move X to Pile 1
}
```

a. **A** = Number of bills with total bill amount less than the average total bill amount
B = Number of bills with total bill amount greater than the average total bill amount

b. **A** = Number of bills from "Big Bazaar" with total bill amount greater than the average total bill amount of "Big Bazaar"
B = Number of bills from "SV Stores" with total bill amount less than the average total bill amount of "SV Stores"

c. **A** = Number of bills from "SV Stores" with total bill amount less than the average total bill amount of "SV Stores"
B = Number of bills from "Big Bazaar" with total bill amount greater than the average total bill amount of "Big Bazaar"

d. **A** = Number of bills with total bill amount greater than the average total bill amount
B = Number of bills with total bill amount less than the average total bill amount

5. The following pseudocode is executed using the "Scores" dataset to grade the students by total marks. Also, the pseudocode counts number of male students in each grade. But the pseudocode may have mistakes in one or more lines. Identify all such lines (if any). It is a Multiple Select Question (MSQ). [4 Marks]

```
1   MinT = -1, MaxT = 301
2   while (Pile 1 has more cards) {
3       Read the top card X from Pile 1
4       if (MinT > X.Total) {
5           MinT = X.Total
6       }
7       if (MaxT < X.Total) {
8           MaxT = X.Total
9       }
10      Move X to Pile 2
11  }
12  Interval = (MaxT - MinT) / 4
13  Mid3 = MinT + Interval
14  Mid2 = Mid3 + Interval
15  Mid1 = Mid2 + Interval
16  CountA = 0, CountB = 0, CountC = 0, CountD = 0
17  while (Pile 2 has more cards) {
18      Read the top card X from Pile 2
19      if (X.Gender == "F" ) {
20          if (X.Total ≥ Mid1) {
21              CountA = CountA + 1
22          }
23          if (X.Total < Mid1 and X.Total ≥ Mid2) {
24              CountB = CountB + 1
25          }
26          if (X.Total < Mid2 and X.Total ≥ Mid3) {
27              CountC = CountC + 1
28          }
26          if (X.Total < Mid3) {
30              CountD =  1
31          }
32      }
33      Move X to Pile 1
34  }
```

a. Error in Line 1
b. Error in Line 19
c. Error in Line 20
d. Error in Line 23
e. Error in Line 26
f. Error in Line 30
g. No error

6. The following pseudocode is executed using the "Shopping bills" dataset. Let **MinT** be a variable that holds the value of the minimum total bill amount. What will be the values of **A**, **B**, **C** and **D** at the end of the execution? [4 Marks]

```
Interval = 1021
Mid3 = MinT + Interval
Mid2 = Mid3 + Interval
Mid1 = Mid2 + Interval
A = 0, B = 0, C = 0, D = 0
while (Pile 1 has more cards) {
    Read the top card X from Pile 1
    if (X.TotalBillAmount > Mid1) {
        A = A + 1
    }
    if (X.TotalBillAmount > Mid2) {
        B = B + 1
    }
    if (X.TotalBillAmount > Mid3) {
        C = C + 1
    }
    else {
        D = D + 1
    }
    Move X to Pile 2
}
```

Answer: **A** = 1, **B** = 3, **C** = 7 and **D** = 24 (Numerical input)

7. The following pseudocode is executed using the "Shopping bills" dataset to find the number of eligible bills for top three total bill amounts. Choose the correct code block to complete the pseudocode. [3 Marks]

```
FirstT = 0, SecondT = 0, ThirdT = 0
while (Pile 1 has more cards) {
    Read the top card X from Pile 1
    if (X.TotalBillAmount ≥ FirstT) {
        ThirdT = SecondT
        SecondT = FirstT
        FirstT = X.TotalBillAmount
    }
    if (X.TotalBillAmount < FirstT and X.TotalBillAmount ≥ SecondT) {
        ThirdT = SecondT
        SecondT = X.TotalBillAmount
    }
    if (X.TotalBillAmount < SecondT and X.TotalBillAmount > ThirdT) {
        ThirdT = X.TotalBillAmount
    }
    Move X to Pile 2
}
Count = 0
while (Pile 2 has more cards) {
    Read the top card X from Pile 2
    **********
    *  Fill the code  *
    **********
    Move X to Pile 1
}
```

a.
```
if (X.TotalBillAmount < ThirdT) {
    Count = Count + 1
}
```

b.
```
if (X.TotalBillAmount ≥ FirstT) {
    Count = Count + 1
}
```

c.
```
if (X.TotalBillAmount > ThirdT) {
    Count = Count + 1
}
```

d.
```
if (X.TotalBillAmount ≥ ThirdT) {
    Count = Count + 1
}
```

e. None of the above

8. The following pseudocode is executed using the "Shopping bills" dataset. What will the values of **A**, **B** and **C** represent at the end of the execution? [3 Marks]

```
A = 0, B = 0, C = 0
while (Pile 1 has more cards) {
    Read the top card X from Pile 1
    A, B, C = DoSomething(X, A, B, C)
    Move X to Pile 2
}

Procedure DoSomething(Y, A, B, C) {
    if (Y.ShopName == "SV Stores" and Y.TotalBillAmount > A) {
        A = Y.TotalBillAmount
    }
    if (Y.ShopName == "Big Bazaar" and Y.TotalBillAmount > B) {
        B = Y.TotalBillAmount
    }
    if (Y.ShopName == "Sun General" and Y.TotalBillAmount > C) {
        C = Y.TotalBillAmount
    }
    return ([A, B, C])
End DoSomething
```

a. Maximum total bill amount of each customer

b. Maximum total bill amount of each shop

c. Shop name of the bill with maximum total bill amount

d. Maximum total bill amount

9. The following pseudocode is executed using the "Paragraph words" dataset. At the end of the execution, **CountB** captures the number of verbs with letter count less than the average letter count of verbs. But the pseudocode may have mistakes in one or more lines. Identify all such lines (if any). It is a Multiple Select Question (MSQ). [6 Marks]

```
1   SumT = 0, Count = 0
2   while (Pile 1 has more cards) {
3       Read the top card X in Pile 1
4       Sum, Count = AddIfVerb(X)
5       Move X to Pile 2
6   }
7   AvgT = Sum / Count
8   CountB = 0
9   while (Pile 2 has more cards) {
10      Read the top card X in Pile 2
11      if (X.LetterCount < AvgT) {
12          CountB = CountB + 1
13      }
14      Move X to Pile 1
15  }

16  Procedure AddIfVerb (Y, SumT, CountT)
17      if (Y.PartOfSpeech == "Verb") {
18          SumT = Y.LetterCount
19          CountT = CountT + 1
20      }
21      return ([SumT, CountT])
22  End AddIfVerb
```

a. Error in Line 4
b. Error in Line 8
c. Error in Line 11
d. Error at Line 12
e. Error in Line 17
f. Error at Line 18
g. Error in Line 21

10. The following pseudocode is executed using the "Words" table. What will be the value of **A** at the end of the execution? [6 Marks]

```
Sum = 0, SumT = 0
Count = 0, CountT = 0
while (Table 1 has more rows) {
    Read the first row X in Table 1
    Sum, Count = AddWord(X, Sum, Count)
    Move X to Table 2
}
B = Sum / Count
Sum = 0, Count = 0, A = 0
Move all rows from Table 2 to Table 1
while (Table 1 has more rows) {
    Read the first row X in Table 1
    Sum, Count = AddWord(X, Sum, Count)
    if (X.Word ends with a full stop) {
        C = Sum / Count
        A = DoSomething(C, B, A)
        Sum = 0, Count = 0
    }
    Move X to Table 2
}

Procedure AddWord (Y, SumT, CountT)
    SumT = SumT + Y.LetterCount
    CountT = CountT + 1
    return ([SumT, CountT])
End AddWord

Procedure DoSomething (P, Q, R)
    if (P < Q) {
        return (R + 1)
    }
    else {
        return (R)
    }
End DoSomething
```

A = 2 (Numerical input)