

Hello computational thinking students. In this tutorial we will see how to solve computational thinking practice assignment uploaded on the online degree website.

Let us start with the instructions given, different font styles or punctuation symbols are used as follows: *Italic plus underline* represents steps of the procedure, **Bold** is used for variables, *Italic* for a field from dataset and **Double quotes** for a value from dataset or dataset name. These different font styles will help us identify various elements of a procedure.

Question 1: **Mark the following statements as True or False.**

Statement 1: **Initial value of variable count should be 0 while counting cards in a stack.**

If we convert this statement into a procedure then it will look something like this,

Step 1. Maintain a variable count and initialize it to 0

Step 2. Read and move 1 card at a time from the stack and increment count

Step 3. Repeat step 2 until stack gets empty

Here, in step 2 we are incrementing the variable count and counting always starts from 1 therefore the initial value of variable count should be 0. Hence, the given statement is True.

Statement 2: **Initial value of variable min should be 0 while finding lowest marks in a subject.**

If we convert this statement into a procedure then it will look something like this,

Step 1. Maintain a variable min and initialize it to 0

Step 2. Read and move 1 card at a time from the stack

Step 3. If subject marks < min then store subject marks in min

Step 4. Repeat steps 2 and 3 until stack gets empty

Here, in step 3 we are updating the variable min only when subject marks are less than the current value of variable min. But if we initialize the variable min to 0 in step 1 then its value will never change because all the subject marks will be higher than 0 and we will end up having incorrect min value. Hence, the given statement is False.

Statement 3: **Initial value of variable max should be 0 while finding highest marks in a subject.**

Let's convert this statement in a procedure which says,

Step 1. Maintain a variable max and initialize it to 0

Step 2. Read and move 1 card at a time from the stack

Step 3. If subject marks $>$ max then store subject marks in max

Step 4. Repeat steps 2 and 3 until stack gets empty

Here, in step 3 we are updating the variable max only when subject marks are greater than the current value of variable max. If we initialize the variable max to 0 in step 1 then all the subject marks will be higher than 0 and we'll get correct max value. Hence, the given statement is True.

If we summarize statement 2 and 3 then we will realize that the initial value of every variable cannot be 0. Especially when we are calculating lowest or min of something, in such scenario the initial value should be the highest in the range. For example, in the case of subject marks, 100 because that is the highest possible value.

Question 2: What will the values of A and B represent at the end of execution of the given procedure on the "Scores" dataset?

And the drive link to the Scores dataset is also given below. We can click on this link to access the dataset but for this question we don't need the actual dataset values.

So, let's start with the given procedure:

Step 1. Arrange all cards in a single pile called Stack 1

Step 2. Maintain two variables A, B and initialize them to 0 and 100 respectively

Step 3. Read and move 1 card at a time from Stack 1 to another pile called Stack 2

Step 4. If $A < \text{Physics marks}$ then store *Physics marks* in A

Step 5. If *Chemistry marks* $<$ B then store *Chemistry marks* in B

Step 6. Repeat from step 3 to 5 until Stack 1 is empty

All these given options talk about the highest and lowest marks of Physics and Chemistry. In this procedure we are doing some computation on Physics and Chemistry marks in steps 4 and 5. And in step 2 variables A and B are initialized to 0 and 100 respectively. Based on what we learned in question 1 we can say that the variable A is used to find max whereas variable B is used for min.

In step 4, variable A gets updated only when Physics marks are higher than the current value of variable A which confirms that the variable A is used for Highest marks in Physics.

Similarly, in step 5 variable B gets updated only when Chemistry marks are lower than the current value of variable B which confirms that the variable B is used for Lowest marks in Chemistry.

Hence, the correct answer for question 2 is option a.

Moving on to question 3: **What will the values of A and B represent at the end of execution of the given procedure on the “Scores” dataset?**

Here, in step 2 variables A and B are initialized to 0. In step 4 we are looking for date of birth which contains the month “July” and if that is the case then we are executing step 5. In step 5, variable A is getting incremented only if the gender is “Male” and if not, then variable B is getting incremented. As we know, in Scores dataset only Male and Female genders are there which means variable B is getting incremented when gender is “Female”. From the combination of step 4 and 5 we can conclude that this procedure finds the number of Male and the number of Female students born in July which is option b.

Next question 4: **The following procedure finds the Town/City of the topper student from the “Scores” dataset. But the programmer may have made a mistake in one of the steps. Identify that step (if any).**

In this question a procedure is given which may or may not contain a mistake. We have to identify if there is a mistake based on the purpose of the procedure given in the statement. Let us read the procedure carefully keeping in mind that it is designed to find city of the topper student.

Step 1. Arrange all cards in a single pile called Stack 1

Step 2. Maintain a variable **max** and initialize it to 0

Step 3. Maintain a variable **city** and initialize it to “None”

This statement may look bit odd but it is correct. The variable city is supposed to store the name of the city which is not a numerical value hence we cannot initialise it to 0 or any other number. Therefore, the variable city is initialized to nothing which is represented by “None”.

Step 4. Read and move 1 card at a time from Stack 1 to another pile called Stack 2

Step 5. If *TOTAL marks* > **max** then store *TOTAL marks* in **max** and *Town/City* in **city**

Step 6. Repeat steps 2 to 5 until Stack 1 is empty

Now, here is the mistake. In step 6, the procedure is repeating the iteration from step 2 which is incorrect because steps 2 and 3 are initialization steps. And initialization should happen

only once before we start the iteration. Therefore, the step 6 should be, repeat steps 4 and 5 until stack 1 is empty.

Hence, the correct answer or the incorrect step is option f.

Question 5: The given procedure finds the number of students having below average TOTAL marks in the “Scores” dataset. Fill in the blanks from the given choices and complete the procedure.

In this question a procedure is given with some missing steps and we have to identify those steps from the given options. The procedure is supposed to find the number of students with below average total marks. For this we will need two non-nested iterations, first to calculate average total marks and then second to find the number of students below that average. To compute average, we have to find the count of students and sum of total marks. This sum of total marks is the missing step at step 5. So, the correct step 5 would be

Add TOTAL marks to variable **sum**

which is there in option c and d.

Now, we have to find the next missing step which is the part of that second iteration where we find the number of students having below average total marks. To find this we should compare students’ total marks with the earlier computed average and if total marks are less than the average then we will increment the variable BAccount. So, the correct step 11 would be

If TOTAL marks < average then increment BAccount

Hence, the correct answer is option c.

Next question 6: The following procedure counts the number of words from the “Paragraph Words” dataset where part of speech is “Verb” and Letter count is greater than or equal to 5. But the programmer may have made a mistake in one of the steps. Identify that step (if any).

Just like question 4, here also we have to find the mistake in the given procedure if there is any. So, let us go through the procedure step by step:

Step 1. Arrange all cards in a single pile called Stack 1

Step 2. Maintain a variable **count** and initialize it to 0

Step 3. Read and move 1 card at a time from Stack 1 to another pile called Stack 2

Step 4. If part of speech is “Verb” and Letter count ≥ 4 then increment count

This is the incorrect step because as per the given statement we are looking for “Verb” with letter count greater than or equal to 5 not 4.

Step 5. Repeat from step 3 to 4 until Stack 1 is empty

Hence, the correct answer or the incorrect step is option d.

Moving on to question 7: **The given procedure finds the average length of words in the “Paragraph Words” dataset. Match the given options with their equivalent missing steps.**

In this question we have to match the given options A, B and C with their appropriate missing steps 2, 5 and 8. Let us read the procedure,

Step 1. Arrange all cards in a single pile called Stack 1

Now, step 2 is missing and we all know that we have to maintain and initialize the variables before we do any operations on them. Therefore, step 2 has to be option B.

Step 3. Read and move 1 card at a time from Stack 1 to another pile called Stack 2

Step 4. Increment count

After that step 5 is missing. In order to calculate average, we require two values count and total and option C computes the total. So, step 5 is option C.

Now, we have left with only one missing step and one option which calculates the average by dividing total by count. Hence, step 8 is option A.

Question 8: **What will the given procedure compute and store in variable X if executed on the “Shopping Bills” dataset?**

In this procedure’s step 4 the variable A’s value will be set to 1 if “Ahmed” has a shopping bill from “SV stores”. Similarly, in step 5 variable B’s value will be set to 1 if he has a bill from “Big Bazaar” and variable C’s value for “Sun General” in step 6. These steps will execute on all shopping bills as part of the first iteration. Then there is second iteration which starts from step 8 which checks the values of variables A, B and C in steps 9, 10 and 11 respectively. If any of these variables’ value is 0 then its respective shop name gets stored in variable X. That will happen only if any of those variables’ values has not been set to 1 in the first iteration. Therefore, variable X will hold the name of the shop which Ahmed never visited which is option e.

Next question 9: What will be the value of X after the execution of the following procedure using the “Shopping Bills” dataset?

This is a numerical input type question where we have to find the exact value of variable X. This procedure counts the total quantity of milk sold across all shops and this is the list of all such shopping bills where item milk is there:

Shopping bill 1	1.5
Shopping bill 3	1
Shopping bill 4	2
Shopping bill 11	2
Shopping bill 17	1
Shopping bill 19	3
Shopping bill 21	2
Shopping bill 23	4
Shopping bill 24	3
Shopping bill 26	3
Total quantity(X)	= 22.5

Hence, the answer of this question is 22.5 which we have to enter manually.

Moving on to the last question 10: The following procedure finds the average total bill amount of all the bills generated at “SV Stores” from the “Shopping Bills” dataset. But the programmer may have made a mistake in one of the steps. Identify that step (if any).

Once again, a procedure is given which calculates the average bill amount of “SV Stores” and we have to identify if there is any mistake in it. So, we will read the procedure step by step:

Step 1. Arrange all cards in a single pile called Stack 1

Step 2. Maintain two variables **sum** and **count** and initialize them to 0

Step 3. Read and move 1 card at a time from Stack 1 to another pile called Stack 2

Step 4. If the *shop name* is “SV Stores” then increment **count** and add *total bill amount* to **sum**

Step 5. Repeat steps 3 and 4 until Stack 1 is empty

Step 6. Maintain a variable **average** and initialize it to 0

Step 7. Calculate average; divide **count** by **sum** and store the result in **average**

Here is the mistake in step 7, average is calculated by dividing sum by count not count by sum. Hence, the correct answer is option g.

Thank you for watching this tutorial.

Happy learning.

