Software Design & Development: Revision Questions 3

1. A function is used to allow an email to be checked to make sure that it contains particular characters.

The program below asks the user to enter an email address and a character to check for.

Both inputs are passed to a function that returns the number of occurrences of the character being checked.

```
…
Line 11 FUNCTION countChars (STRING email,STRING charToCount)
        RETURNS INTEGER
Line 11 DECLARE letterCount INITIALLY 0
Line 12 DECLARE currentLetter INITIALLY ""
Line 13 FOR index FROM 1 TO LEN(email)
Line 14     SET character TO email[index]
Line 15     IF character = charToCount
Line 16         Increment letterCount
Line 17     END IF
Line 18 END FOR
Line 19 RETURN letterCount
Line 20 END FUNCTION
…
…
Line 52 RECEIVE address FROM STRING KEYBOARD
Line 53 RECEIVE charCheck FROM INTEGER KEYBOARD
Line 54 SET quantity TO countChars(address, charCheck)
Line 55 DISPLAY quantity
…
```

(a) Identify the actual and formal parameters in the above code.

(b) A breakpoint is set at line 18. The function is tested by entering the two inputs shown

Input 1: jo@belmont.com **Input 2:** @

Copy and Complete the table below to show the values of `character` and `letterCount` for the first 3 times the execution stopped.

Break in Execution	character	letterCount
First		
Second		
Third		

(c) Using a programming language with which you are familiar, identify a pre-defined function that could be used in line 14 to extract each character from the email address.

2. The ASCII table contains 256 characters, numbered from 0 to 255. (see last page)

The program below asks the user to enter a start value and an end value.

Both inputs are passed to a function that generates and returns a string containing the characters in the range provided.

```
…
Line 11 FUNCTION getCharacters (INTEGER start,
        INTEGER end) RETURNS STRING
Line 12 DECLARE letterSequence INITIALLY ""
Line 13 DECLARE currentCharacter INITIALLY ""

Line 14 FOR index FROM start TO end
Line 15     SET currentCharacter TO <character equivalent of
            index>
Line 16     SET letterSequence TO letterSequence &
            currentCharacter
Line 17 END FOR
Line 18 RETURN letterSequence
Line 19 END FUNCTION
…
…
Line 52 RECEIVE first FROM INTEGER KEYBOARD
Line 53 RECEIVE last FROM INTEGER KEYBOARD
Line 54 SET letters TO getCharacters(first, last)
Line 55 DISPLAY letters
…
```

(a) Identify the actual and formal parameters in the above code.

(b) A breakpoint is set at line 17. The function is tested by entering the two inputs shown

Input 1: 67 **Input 2:** 75

Complete the table below to show the values of `currentCharacter` and `letterSequence` for the first 3 times the execution is stopped.

Break in Execution	currentCharacter	letterSequence
First		
Second		
Third		

(c) Using a programming language with which you are familiar, identify the pre-defined function that could be used in line 15.

(d) Explain why an execution error would occur if the value 290 was entered as a start or end input.

(e) The letters are to be outputted in reverse order. Using a recognised design technique, design an algorithm to reverse and store the new message.


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