

VANCOUVER ISLAND UNIVERSITY
CSCI 112 — FINAL EXAMINATION
14 December 2021, 9:00 — 12:00

Duration: 180 Minutes

Instructor: H. Liu

TO BE ANSWERED IN BOOKLETS
Instructions

- Students must count the number of pages in this examination paper before beginning to write, and report any discrepancy immediately to the invigilator.
- This examination paper consists of 6 pages.
- This is a CLOSED BOOK examination. You are allowed to bring one piece of letter-sized and double-sided notes.
- Calculators, electronic devices and network connection access are NOT permitted.
- Remember to state any assumptions and show rough work.
- Note carefully the weight of each question, and answer appropriately.
- Attempt all questions. All questions relate to material covered in the lectures, labs and assignments.

1. (15 Marks) Answer the following questions clearly and briefly.

- (a) It is generally required that names of declared variables in a VBA program should be meaningful. Explain what is the criteria for a variable name to be “meaningful”. You can use examples to illustrate your understanding.
- (b) Explain how two literal string values are compared in a VBA statement. For example, how do we know that the Boolean expression (“John” > “Jacob”) would return True?
- (c) What is the syntactic and semantic difference between a function and a subroutine in the programming language VBA?
- (d) When trying to execute the following block of VBA code (variables are all properly declared already):

```
For row = 2 To 10
    For col = 2 To 10
        Cells(row, col) = row * col
    Next row
Next col
```

a compile time error of “Invalid Next control variable reference” is displayed. Explain what caused this compile error and how to fix it.

- (e) Given the following two blocks of VBA code:

<pre>If x < 0 Then y = 3 ElseIf x < 10 Then y = 4 Else y = 5 End If</pre>	<pre>If x < 0 Then y = 3 Else y = 4 End If If x >= 10 Then y = 5 End If</pre>
(Block A)	(Block B)

Are they logically the same? If your answer is no, give an example to explain how the two blocks behave differently. If your answer is yes, explain which block of code is more efficient and why.

2. (9 Marks)

- (a) In the active workbook, there are multiple worksheets. Write a block of VBA code/statements to first declare a variable called *sourceWS*, and then assign the variable to represent the last worksheet in the active workbook.
- (b) Write a block of VBA statements to first declare an integer array variable called *data* with the capacity of 20, initialize each element to -1, and then resize the array to capacity of 40 while preserving the values in the original array.
- (c) Suppose there is exactly one character stored in a string variable called *aChar*. Write a Boolean expression that is evaluated to TRUE if this character is a letter. The case of the letter should be ignored.

3. (14 Marks) A gift seller stores its product catalog in an Excel worksheet.

The first row is the title row. From **row 2** to **row 1036**, each gift product's information is stored in one row. The gifts' product id are stored in column A, names of the gifts are stored in column B, description in column C, price in column D, and the average review rating (out of 5) of the gifts from the previous buyers are stored in column E.

A customer wants to find the best gift \$50 can buy for her friend's birthday.

Your task is to write a VBA subroutine to help the customer select the **most expensive** gift the customer can buy **within her budget of \$50**, and display (using message box) the selected gift's name, description and price.

If there are more than one gift that are equally most expensive, select the one with the highest review rating. If there are more than one gift that are equally most expensive and equally high in review rating, then select the first such gift.

You can safely assume that the catalog worksheet is the active worksheet when your program is executed.

4. (14 Marks) Write a VBA function called `truncate` that takes a string as its parameter, removes any leading and trailing whitespaces (i.e., whitespaces before the first non-whitespace character and after the last non-whitespace character in the string respectively) if there are any, and returns the rest of the string.

For example, if the parameter string is “ An example ”, then the processed and returned string should be “An example”. If the parameter string is “Another example ”, then the processed and returned string should be “Another example”.

(Note: As you should have seen in the assignment and lab, you can use the function `Len(aString)` to get the length of the string `aString` (i.e., the number of characters in the string), and the function `Mid(aString, index, 1)` to get one character in the index position in the string `aString`, where the index of all characters in the string goes from 1 to `Len(aString)`.)

5. (14 Marks) A company records its employees' donations in an Excel file. In the worksheet, the first row is the title row. And starting from row 2, donation records are stored continuously without blank rows in the data area. Each data row records one donation made by an employee. The employee's employee number (a string) is stored in column A, his/her name in column B, the dollar amount of the donation made by him/her this time in column C (a floating point number), and the date when this donation was made in column D.

An employee can make multiple donations in the duration of records. Each donation occupies one row.

Your task is to write a VBA function, called `sumDonationTotal`, that takes an employee's employee number as its parameter input and returns the total dollar amount of donation this given employee made in the whole duration of records.

If the given employee never made any donation (i.e., the given employee number doesn't exist in the worksheet records), your function should simply return 0.

You can safely assume that the donation record worksheet is the active worksheet when your function is executed.

This function doesn't perform any user-computer interface tasks.

6. (14 Marks) The company mentioned in the previous question decided to match each employee's total donation. For each employee, if the employee made total donation of \$1000 or less, the company would match 100% (i.e., match with the same amount); if the employee made more than \$1000 donation, the company would match 100% for the first \$1000, and 50% for any amount exceeding \$1000.

The company has more than 100 employees. In an Excel worksheet, the company lists each employee's employee number in column A, the employee's name in column B. The first row is the title row. And starting from row 2, each employee occupies one row. There is no blank row in the data area.

No matter whether you've developed the function mentioned in the previous question, you can assume that this function `sumDonationTotal` has been successfully developed and can be used readily to give you the total donation amount of an employee if you pass the employee's employee number to the function.

Your task is to develop a VBA subroutine that performs the following tasks **for each employee and for all employees**:

- get each employee's total donation amount by calling the function `sumDonationTotal`;
- write the returned amount to column C of this employee's row;
- calculate how much the company should match this employee's donation; and
- write the matching amount to column D of this employee's row.

You can safely assume that the employee record worksheet is the active worksheet when your program is executed. And you can ignore whether and how the function `sumDonationTotal` works properly to get its data.

7. (20 Marks) An elementary school runs a hot lunch program and wants to have a VBA application to help parents place orders for their children.

For each order (for one child only), the parents **must choose exactly one** from the following main entries provided by the hot lunch program:

- Cheese Pizza, for \$3.75,
- Ham Sandwich, for \$3.25, or
- Chicken Wrap, for \$3.50.

Then, the parents **must** add a drink to the order. The hot lunch program provides a choice of either milk (\$0.75) or juice (\$1.25). Finally, the parents can choose to add 0, 1 or many (up to 10) pieces of fruit to the order (\$0.25 per piece).

You are asked to do the following **three tasks**:

- (a) Design a userform to collect the information of one order, including the main entry choice, the selected drink type and the number of fruit pieces ordered.
And the userform should have two command buttons, one captioned as “Calculate Charge”, and the other one captioned as “Clear Info”.
Draw a rough picture to show the userform and its controls. For each control, clearly indicate its name, type and caption.
- (b) Write a VBA subroutine to handle the event of “Calculate Charge” command button click. This subroutine should calculate the charge of the order based on the user choice information collected from the userform, and then display the total charge of the order using a message box.
- (c) Write a VBA subroutine to handle the event of “Clear Info” command button click. This subroutine should reset the userform in such a way that, by default, Cheese Pizza is selected as the main entry, milk is the selected drink, and 2 pieces of fruit is ordered.

===== END OF EXAM QUESTIONS =====