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COURSE: SOFTWARE ENGINEERING.....

LOCATION: SWANSEA

LLEOLIAD: ABERTAWE

LEVEL 4

LEFEL 4

EXAMINATION PERIOD
MAY 2019

CYFNOD ARHOLIADAU
MAI 2019

MODULE CODE: ACCA4016
ACADEMIC AND EMPLOYABILITY SKILLS
(COMPUTATIONAL THINKING)

TIME: 2 HOURS

NOTE: IN-CLASS TEST, WED 15th MAY 2019 PM

Equipment or materials required – Computers with Visual Studio installed

Adnoddau neu ddefnyddiau sydd eu hangen – Cyfrifiraduron gyda Visual Studio

This is an open-book test, you may consult notes and/or Moodle.

ANSWER ALL QUESTIONS

8
28
12
—
487

1. [20 marks total:]

No code is required to answer this question.

A software developer is asked to write a program to calculate the tax paid on a number of products that have been purchased throughout the year. To use the application, the user must enter a valid username and password within three attempts. If they fail to correctly login after 3 attempts, they must be prevented from logging in again for 5 minutes.

Constraint 1: The correct username and password can be defined in the code itself, there is no need to enter or provide this information.

Constraint 2: The user must initially enter the total number of products for which they are going to enter values.

Based on this scenario, answer the following questions:

- A. A programmer has created a function named *InputCostsProcessAndOutputResult*. Give reasons why this function name is a poor choice and why it suggests the programmer has not given sufficient attention to the structure of the code.

[4 marks]

InputCostsProcessAndOutputResult is a poor function name because it is extremely general.

there are too many arguments in the name, which is not wrong because a function can execute them, however it neglects to specify what the "process" is, and the type of "costs" and "results" associated. ✓ 2

within a large database of functions it would be difficult to dictate the exact function of this function.

ambiguously named functions make readability impossible when revisiting after a long period. ✓ 1

- B. Provide a list of the problems that must be solved to implement the code for this application and place them in the order that you would attempt to solve them. Avoid vague statements that may involve solving multiple problems. However, the problems identified may be posed in the form of questions e.g. "How do I choose a colour?".

How to find the exact percentage of tax removed from each product.

Does tax differ on each individual product e.g. ✓
What if user was abroad and didn't pay tax?

Is there a way of calculating the tax value after all product prices are added, ~~eg. item price x tax~~

How to limit user from reentering for 5 minutes.

How can 5 minutes be measured using computer clock if user can simply change time to access before time limit.

What if the user enters 5 products but only has the price of 3. ✓/2

3

[8 marks]

- C. Describe the tests you would use to confirm the program is running correctly.

[8 marks]

The ~~spes~~ ~~sup~~ basic test a developer would employ is fact checking the results to see if calculations are correct, after which running the program while verifying the auto's to ~~at~~ project the ~~an~~ outcome after various uses.

Other tests include verifying the internal structures of the program using "white-box testing" methods such as intentionally entering wrong values to track program behaviour, for example adding ~~test~~ letters or symbols instead of the correct datatype variable. ✓

Developers will often introduce static testing whereby the information entered is analysed in correlation the the result

It produces. More examples include Analysing the requirement phase thoroughly before implementation, ✓
Using software tools such as debugging, scope etc

2. [50 marks total:]

Using **appropriate functions** implement an application which displays a text-based menu listing that allows the user to select between calculating the area of a rectangle, calculating the area of a circle and exiting. For example, the menu might display "1. Calculate area of rectangle" and the user must enter the number one to select this option. If they choose not to exit then the menu should be redisplayed and they should be allowed to select another option. When calculating the area of the rectangle they must be prompted to enter the width and the height of the rectangle, but when calculating the area of a circle they should be prompted to enter the radius. In both cases, the result should be displayed once it has been calculated.

The program may look like this:

```
1. Calculate area of rectangle
2. Calculate area of circle
3. Exit
```

```
Choose option: 1      ← Text shown in RED is entered by user
Please enter width: 2
Please enter height: 3
Area of rectangle is 6
```

```
Choose option: 3
Program is exiting
```

- A. Provide a list of the problems that must be solved to implement the code for this application and place them in the order that you would attempt to solve them. Avoid vague statements that may involve solving multiple problems. However, the problems identified may be posed in the form of questions e.g. "How do I choose a colour?".

[20 marks]

- Inappropriate values entered for menu option such as minus numbers or zeros or symbols ✓
- A loop which is iterated based on user choice ✓
- What is values of rectangle are inappropriate
- When using if or while statement loop will stop if wrong variable type entered.
- How to clear the screen of previous results & so to not confuse user
- Use a loop or while statement
- How can I manipulate the loop index to be never ending without writing too much code

(more space to write overleaf)

- how to jump between function while maintaining the variables locally
- Can I use Recursion to prevent Global Variables
- is there a limit of how many times the function will call it self or others
-

6

B. Write the code (in Visual Studio) for the functions required to solve the problems previously identified.

Hint 1: Develop the code in stages, marks will be awarded for any working code that contributes to the solution.

Hint 2: Area of rectangle = width x height

Hint 3: Area of circle = $\text{PI} * \text{radius}^2$ ← Ask if you don't understand "squared"

[30 marks]

22

3. [30 marks total:]

A program must determine if a point (x, y) is contained within a square. To define the square, the user must first enter the top left position (x_L, y_T) and the width of the square. Having entered this information, they may then enter the position of the point and the program should display either "Point is contained in the square" or "Point is outside of the square".

A.

Explain the steps and the logic required to solve this problem.

Hint: What is the left, right, top and bottom of the square?

Note 1:

You may include diagrams in your explanation.

Note 2:

Marks will be awarded for simplifying this problem if you are unable to solve it.

Attacking a problem from a different angle is perfectly acceptable provided you can provide reasonable arguments to justify your approach i.e. you are attempting to learn something new about the original problem.

[20 marks]

- Creating a 2D array
 - User enters values of rows and columns
 - they displayed using for loop
 - User is asked to enter location using co-ordinates
 - Using if statements ~~such~~ we identify if the co-ordinates are greater or smaller than the parameters set by the users
 - this is done through if statement is == to or greater than etc
-
- Another way is drawing square using cout and number it $\rightarrow$ just for visual aid.
 - the user would be asked co-ordinates and if they are greater or less than the square display message is prompted.

B.
Implement the code (in Visual Studio) for your solution.

[10 marks]



Diwedd/End

