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COURSE: Software Development

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

11
35
24
70%

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]

It does not give a good indication on what the function is going to do

✓2

- 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?".

Must ask user for username and password. ✓ 1
Must assign a correct username and password.
Must compare the usernames and passwords.
If they are different must ask user to enter again.
Must record amount of failed attempts. ✓ 2
If failed attempts is 3, lock user out for 5 minutes.
If username and password are correct then
ask user for total number of products. ✓ 1
For the amount of products ask for their values. ✓ 1
For the amount of products calculate the tax paid. ✓ 1
Output the tax paid to the user. ✓ 1

[8 marks]

- C. Describe the tests you would use to confirm the program is running correctly. [8 marks]

Fail login 3 times and check duration locked out ✓
Check whether the values they enter is the same as
the number of products the user specifies ✓
Run the program 3 times and check whether the tax
paid values are correct each time

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]

Output the 3 options for the user
Ask the user which option and store their result ✓3
Execute the appropriate function for their choice
For rectangle ask the user for width and height
and store these variables ✓3
Calculate Area and return the answer
Ask the user again for their option
If triangle ask the user for the radius? and store the variable ✓2

(more space to write overleaf)

Calculate the Area and return the answer
Ask the user again for their option ~~area~~
If Exit then exit the program ✓ 3

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]

24

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]

To figure out whether the point is in the square or not you can test whether the point is less than y_T and greater than x_L while not being less than y_B and greater than x_R .

To find (x_R, y_B) for right bottom we use the width, as a square has all equal sides, thus the width = height

14

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

[10 marks]

10

Diwedd/End

