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COURSE: Web 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

12
41
67

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]

- the input and the output must be in separate functions.
- the total number of products should be entered, not the cost
- Does not specify what costs $\pounds$.
- Does not specify what result.

- 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?"

- Input total number of products purchased ✓
- Input total cost of each product ✓
- ~~Calculate amount of tax~~ Create a function which multiplies the value of tax with the cost of the product. ✓
- Output amount of tax for each product. ✓
- Multiply the tax for each product with the quantity. ✓
- Make sure the amount of times the user is asked to enter a product price matches the quantity of the products.
- Ask for username and password before running above code - ✓

[8 marks]

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

[8 marks]

- Output total amount of products user has entered.
- Output total cost user has entered for each item.
- Output ~~total~~ value of tax of each product and compare with a calculator value. ✓
- Confirm the user is allowed in the system when they enter the correct username and password. ✓
- Ensure they are locked out for five minutes after three attempts by trying to log in with 3 false logins. ✓
- ~~Ensure~~ they are ~~not~~ allowed to enter ~~or~~ text, if so, ask them to enter number values only. ✓
- Check if ~~the~~ the program will stop them entering non-alphanumeric values, if yes ensure the code does not let them and asks them for ~~the~~ input again. ✓

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
```

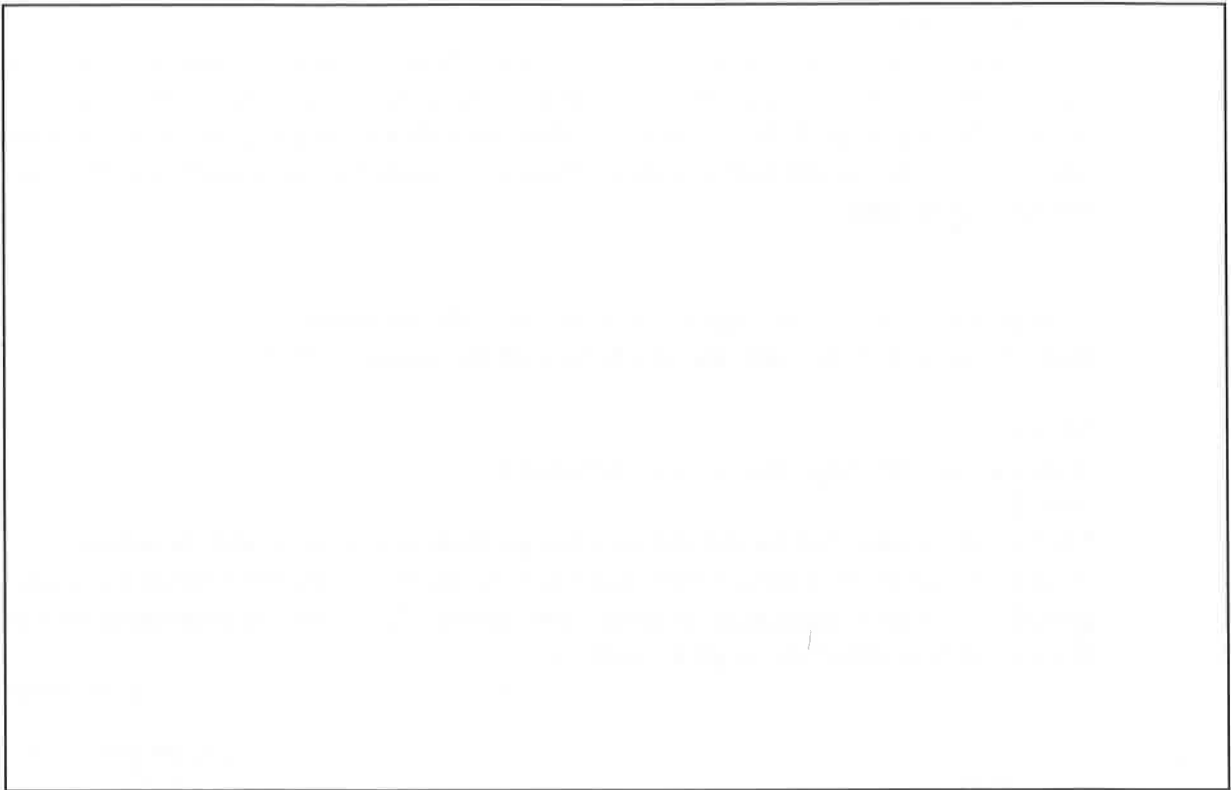
```
Program is exiting
```

- 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]

- Give the user three options to select from.
- If option 1 is chosen, ask them to enter width of ~~rectangle~~ ^{rectangle}.
- Next ask them height of ~~rectangle~~ ^{rectangle}.
- Calculate area of rectangle in separate function.
- Output area of rectangle.
- If option 2 chosen, ask for radius of circle.
- Calculate area of circle in separate function.
- Output area of circle.
- If option 3, exit the code.
- Ensure user is given three options to choose from again each time user chooses option 1 or 2.

(more space to write overleaf)



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]

27

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]

Multidimensional array square[8][8]

0 Top
8 Bottom
0 left 8 right

determines coordinates of top edge

Top left position x_L , y_T

x_L = left or right, 0 = furthest left, 8 = furthest right.
 y_T = top or bottom, 0 = highest, 8 = lowest.

Width of point - how many arrays^{chars} does it take up i.e. 1-8.

If x_L , y_T numbers 0-7 point is within square

If $x_L = 6$ or $y_T = 6$ and width < 2 not within square

loop

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

[10 marks]

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Diwedd/End

