



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

NAME: Mark Huntly.....
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

42

26

80%

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]

There are a number of reasons why this is a poor choice.

- 1/ It is very long.
- 2/ It is trying to do too much, it could be two separate functions. Function does 1 thing ✓ 2
- 3/ It suggests that it is doing something different than was asked for, i.e. it should calculate tax not costs. ✓ 2
- 4/ it doesn't suggest it deals with any of the product entry or the values for them.
- 5/ It consists of possibly reserved words.

- 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?".

1. enter total number of products
2. enter values to the products ✓
3. Calculate tax on the values (or total value) ✓
4. Enter username ✓
5. Enter password ✓
6. Failure to login after 3 attempts. ✓
7. Enter individual products ✓
8. Ask the question to request values.

[8 marks]

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

[8 marks]

1. Enter wrong username 3 times ✓
2. Enter wrong password 3 times ✓
3. Enter right username & password ✓
4. Display amount of products
5. Display values for products ✓
6. Test entry of numbers and not characters ✓
7. Test output of tax amount with various results ✓
8. Test total value result output.

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
```

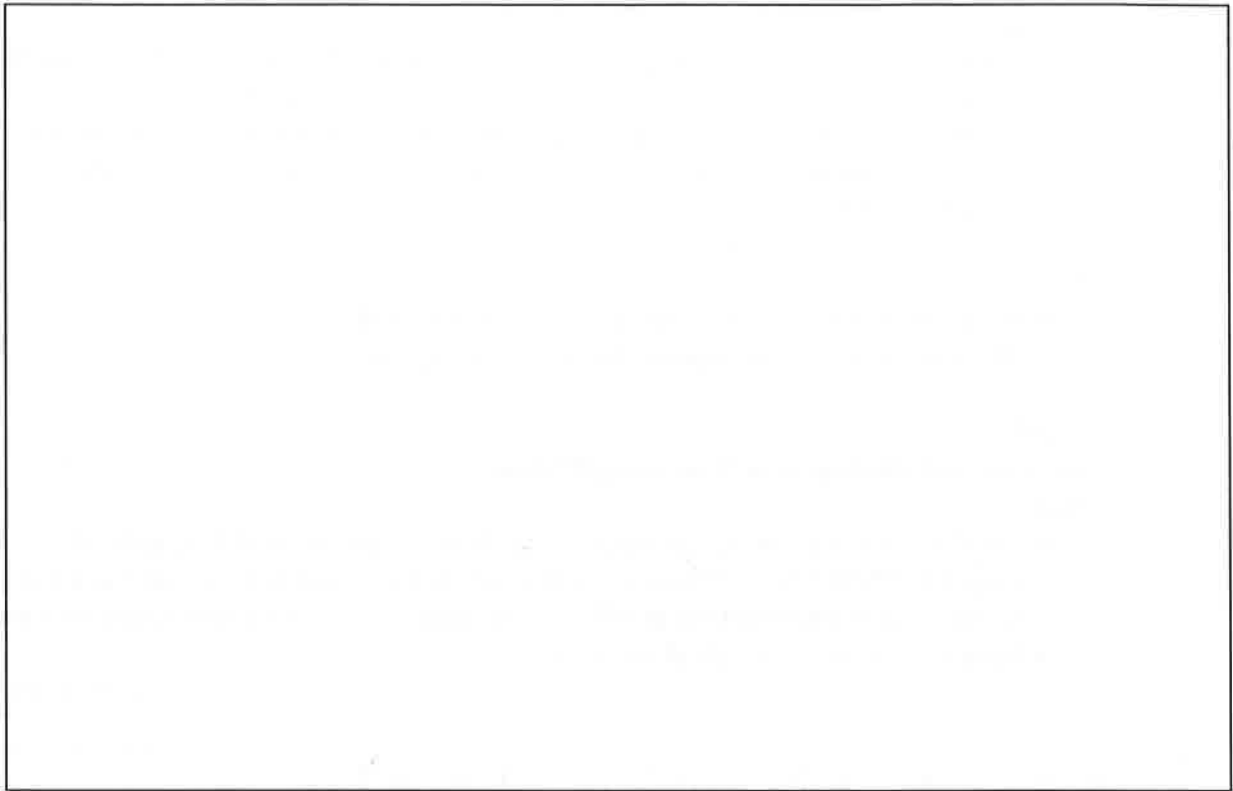
- A. Provide a list of the problems that must be solved to implement the code for this application and place them in the order that you would attempt to solve them. Avoid vague statements that may involve solving multiple problems. However, the problems identified may be posed in the form of questions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

[20 marks]

1. Create a menu output for options ✓
2. Allow choice of options
3. Use choice to obtain right inputs and calculation
4. prompt for relevant information for calculation
5. calculate relevant area.
6. Output result ✓ 2
7. loop back if not chosen 1, 2, 3. ✓
8. Calculate area of a rectangle ✓
9. Calculate area of a circle. ✓

14

(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]

28

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]

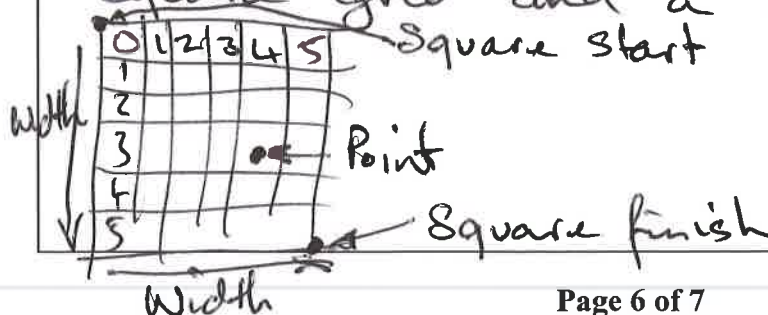
1. Enter top left position (x, y)
2. ~~calculate~~ Bottom right position (x, y) from width
3. Enter Point position (x, y)
4. If point position (x, y) is greater than top left position (x, y) and smaller than bottom ^{right} position (x, y) ~~the~~

Then display "Point is contained in the square"

Else display "Point is outside square."

END IF.

This is done by overlaying the square grid and a point grid.



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

[10 marks]

10

Diwedd/End

