



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

NAME: DONNA WRIGHT
COURSE: computing - Computer networks and cyber security

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

10

32

15

57%

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]

- Name covers 3 separate functions.
 - input costs
 - process
 - output results✓ 2
- No requirement for log on
- No requirement for user to enter no. of products ✓
- function name too long
- Activities should be broken down into separate stages/steps. ✓ 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?".

- User to authenticate to system with name + password within 3 attempts ✓
- User to enter no. of products ✓
- User ~~enters~~ inputs entries (limited to no. specified).
- Check input is valid for each entry ✓
- If correct call function to process
- Function processes entries with tax ✓
- Function returns values
- Values printed on screen
- Program ask user if they wish to use program again.

[8 marks]

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

[8 marks]

- test user can only attempt to authenticate 3 times ✓
- test ~~whether~~ validation of characters entered, i.e. chars + negative numbers ✓
- test whether program loops if user ~~is~~ wishes + whether negative value effect this.

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]

- Invite user to calculate area of ~~the~~ rectangle, circle or to exit - user inputs selection, check input valid.
- Create 2 functions, 1 for rectangle ^{function 1} & 1 for circle ^{function 2}
- ~~prompt user to if rectangle, user to be prompted to enter width + height~~
- ~~program returns area~~
- Function 1
 - Get user to enter height
 - Get user to enter width
 - check input is valid
 - ~~program runs function~~ correct - call function
 - function returns value
 - value printed to screen
 - Ask user if they wish to use program again.

(more space to write overleaf)

Function 2

- Get user to enter radius
 - Check input is valid
 - correct - call function
 - function returns value
 - Value printed to screen
 - User asked if they wish to run program again.
-
- User chooses to exit ✓
 - program closes ✓

15

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]

17



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:

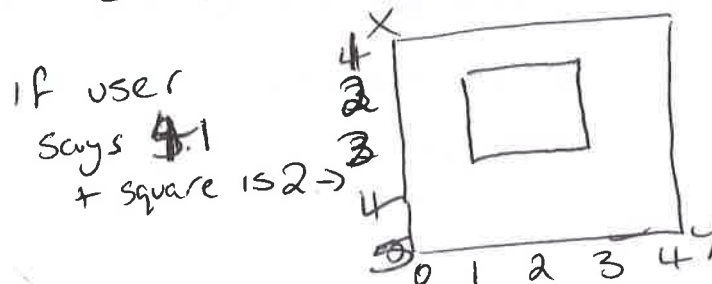
Marks will be awarded for simplifying this problem if you are unable to solve it.

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]

- User must determine start i.e. top left
- User specifies width of square (square is space inside a square)

So . . .

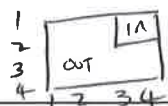


all points outside square are out.

user to select spot as top left
user defines width.

user enters a pointer — 1.2

Program determines if within defined square



1.4 is in
1.2 is out.

how?

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

[10 marks]

3

Diwedd/End

