Name: Class:

Task 1

1. A program needs a user to consent to the terms and conditions before they can continue to use it.

Create a presence check that will check that the character ‘y’ has been entered before it continues. The program will continue to ask them until ‘y’ is entered.

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Task 2

1. A program takes one input. The program then checks if the input is a valid number. For a valid input, the number must be five digits long and start with a 9. If the number is valid, the program will output “Valid number”. Otherwise, the program will output “Invalid number”.

(a) Which **two** types of validation are used in the program?

Validation 1:

Validation 2:

(b) Write the program to validate an input.

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2. Write a program that takes three inputs:

* A username – this must be all letters
* An ID number – this must start with the letters ‘ID’
* A room number – this must be three characters long and have the pattern   
  <capital letter><digit><digit>

If any of these inputs is invalid, the user will repeatedly be asked for them until they have entered them correctly.

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Task 3

1. Once method of calculating a check digit is to add all the digits together. The check digit is then the final digit of the total.

Using this algorithm, calculate the check digit for the number 546321.

2. EAN-13 barcodes are often used for products in UK supermarkets.

The check digit for these codes is calculated by the following algorithm:

* Multiply the barcode number so that each digit in an odd position is multiplied by 1 and those in even positions are multiplied by 3.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N1 | N2 | N3 | N4 | N5 | N6 | N7 | N8 | N9 | N10 | N11 | N12 | Check digit |
| x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 |  |

* Add the resulting numbers together to make a total.
* Subtract the total from the nearest multiple of 10 to get the check digit.

For example, to find the check digit for the EAN-13 barcode number 887651234592 we would carry out the following:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 8 | 7 | 6 | 5 | 1 | 2 | 3 | 4 | 5 | 9 | 1 | Check digit |
| x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 |  |
| 8 | 24 | 7 | 18 | 5 | 3 | 2 | 9 | 4 | 15 | 9 | 3 |  |

8+24+7+18+5+3+2+9+4+15+9+6=107  
Nearest multiple of 10 is 110, so subtract 107 from 110: 110-107=3  
The check digit is 3, so the full EAN-13 barcode is: 8876512345913

Calculate the EAN-13 barcode check digit for the following number:

524321937154

Use the following table to help you with your calculation.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  | Check digit |
| x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

3. Two methods for calculating check digits have been given in question 1 and question 2. The first method is easier to write a program for and will require less processing.

Why do you think the second more complicated algorithm is more commonly used when checking numbers that a user enters?