DEV.BUILD WORKBOOK WEEK 2

LAB 2.1: ROOM CALCULATOR

Task: Calculate the perimeter and area of various classrooms at Grand Circus.

What will the application do?

- The application prompts the user to enter values for the length and width of a classroom.
- The application displays the area and perimeter of that classroom.
- The application classifies the room as small (up to 250 square feet), medium (more than 250 but less than 650 square feet, or large (650 square feet or more.
- The application prompts the user to continue (keep measuring rooms!).

Build Specifications

1. Assume that the rooms are perfect rectangles.
2. Assume that the user will enter valid numeric data for length and width.
3. The application should accept decimal entries.

Hints:

- Make sure you use the right formulas for area and perimeter.
- The Snug is 24′ 6″ x 20′ 0″. The Penthouse is 42′ 6″ x 16′ 6″.

Extra Challenges:

- The application should continue only if the user agrees to.
- Calculate the volume of the rooms. (Ask the user for the height as well, or assume a height of 10′.)

See next page for console preview.

Console Preview:

Welcome to Grand Circus' Room Detail Generator!

Enter Length: {user input here, for example: 24.5}
Enter Width: {user input here, for example: 20}
Area: {calculated: 490}
Perimeter: {calculated: 89 }
{calculated: This is a medium-sized room.}

Continue? (y/n): {user input here, for example: Y}

Enter Length: {3}
Enter Width: {4}
Area: {12}
Perimeter: {14}
{calculated: This is a small-sized room.}

Continue? (y/n): {N}

Thank you for using the Room Detail Generator!

LAB 2.2: TABLE OF POWERS

Task: Display a table of powers.

What will the application do?

- The application prompts the user to enter an integer.
- The application displays a table of squares and cubes from 1 to the value entered.
- The application prompts the user to continue.

Build Specifications

1. Assume that the user will enter valid data.
2. The application should loop and ask for input again if the user wants to continue, or end otherwise.

Hints:

- Don't mess up the difference between squares and cubes!
- Use \t to tab to line up columns properly

Extra Challenges:

- Research formatted strings and right-align the numbers in columns instead of left-aligning them
- Find out the maximum number whose cube will fit in an int, and limit the user input to that number or less
- Reject 0 or negative numbers as user input

Console Preview:

```
Learn your squares and cubes!

Enter an integer: {user input here, for example: 5}

Number          Squared         Cubed
=======         =======         ======
1               1               1
2               4               8
3               9               27
4               16              64
5               25              125

Continue? (y/n): {user input here, for example: Y}

Enter an integer: …
```

LAB 2.3: VALIDATING INPUT WITH REGEX

Task: Write a program that will recognize invalid inputs using regular expressions.

What will the application do?

- The program will validate different kinds of input.

Build Specifications

1. Try to figure these out without looking up others' solutions!
2. Write a method that will validate names. Names can only have alphabets, they should start with a capital letter, and they have a maximum length of 30.
3. Write a method that will validate emails. An email should be in the following format: {combination of alphanumeric characters, with a length between 5 and 30, and there are no special characters}@{combination of alphanumeric characters, with a length between 5 and 10, and there is no special characters }.{domain can be combination of alphanumeric characters with a length of two or three}
4. Write a method that will validate phone numbers. A phone number should be in the following format: {area code of 3 digits} – {3digits} – {4 digits} such as 313-555-1212
5. Write a method that will validate date based on the following format: (dd/mm/yyyy).

Hints:

- Use https://regexr.com/ to try out the regular expressions before adding them to your C# code.

Extended Challenges:

- Accept multiple possible formats for telephone numbers, including (313)-555-1212 and 313.555.1212
- Accept 1 or 2 digits for month and day (in which case the invalid date example below would be valid)
- Only accept the proper ranges for month (1-12) and day (1-31).
- Write a method that validates HTML elements (Example: is a valid html element, and <h1 <h1> is not valid. Don't worry about special cases where you have self-contained HTML elements).

See next page for console preview.

Console Preview:

```
Please enter a valid Name: James123
Sorry, name is not valid!

Please enter a valid email: james@james.com
Email is valid!

Please enter a valid phone number: 333443443434
Sorry, phone is not valid!
Please enter a valid date: 3/4/18
Sorry, date is not valid!
```

ADDITIONAL EXERCISES

Note that not all these exercises will be assigned. You're welcome to do extra exercises for your own practice, but you're encouraged to complete all the extra challenges in your lab for the day first.

EXERCISE 1

Description
Prompt the user to enter a string. After the user enters a string, output the same string back to the console.

Example
```
>>Enter some text: <<Hello, World! ECHOOOOOO!
>>Hello, World! ECHOOOOOO!
```

EXERCISE 2

Description
Prompt the user to enter a number. After the user enters a number, add 1 to the number and output it back to the console.

Example
```
>>Enter a number: <<52
>>53
```

EXERCISE 3

Description
Prompt the user to enter a number. After the user enters a number, add .5 to the number and output it back to the console.

Example
```
>>Enter a number: <<17.3
>>17.8
```

EXERCISE 4

Description
Prompt the user to enter two numbers. After the user enters the numbers, add them together and output the sum back to the console.

Example
```
>>Enter a number: <<12.2
>>Enter another number: <<17.3
>>The sum is 29.5
```

EXERCISE 5

Description
Prompt the user to enter two numbers. After the user enters the numbers, multiply them and output the product back to the console.

Example
```
>>Enter a number: <<10.2
>>Enter another number: <<13.4
>>The product is 136.68
```

EXERCISE 6

Description
Use a do-while loop to output "Hello, World!" in a loop. Each time you output "Hello, World!" ask the user whether they would like to continue.

Example
```
>>Hello, World!
Would you like to continue (y/n)? <<y
>>Hello, World!
Would you like to continue (y/n)? <<y
>>Hello, World!
Would you like to continue (y/n)? <<y
>>Hello, World!
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 7

Description
Use a do-while loop to run exercise 1 in a loop. Each time you run the code ask the user whether they would like to continue.

Example
```
>>Enter some text: <<Hello, World! ECHOOOOOO!
>>Hello, World! ECHOOOOOO!
Would you like to continue (y/n)? <<y
>>Enter some text: <<Hello, World! ECHOOOOOO again!
>>Hello, World! ECHOOOOOO again!
Would you like to continue (y/n)? <<y
>>Enter some text: <<Hello, World! ECHOOOOOO againnnn!
>>Hello, World! ECHOOOOOO againnnn!
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 8

Make exercises 2-5 run in a loop. Use a do-while loop to run the code in a loop. Each time you run the code ask the user whether they would like to continue.

EXERCISE 9

Description
Prompt the user to enter a language. Based on the language the user input, display "Hello, World!" in that language. Use a switch statement to choose what to display.

Example
```
>>Enter a language: <<English
>>Hello, World!
Would you like to continue (y/n)? <<y
>>Enter a language: <<Spanish
>>Hola Mundo!
Would you like to continue (y/n)? <<y
>>Enter a language: <<Dutch
>>Hallo wereld!
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 10

Description
Determine whether the user is tall enough to ride a roller coaster. Prompt the user to enter her height in inches. If she is less than 54 inches tall, notify her that she cannot ride the Raptor. If she is at least 54 inches tall, notify her that she can ride the Raptor.

Example
```
>>Enter your height in inches: 52.3
>>Sorry, you cannot ride the Raptor. You need 1.7 more inches.
Would you like to continue (y/n)? <<y
>>Enter your height in inches: 55.9
>>Great, you can ride the Raptor!
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 11

Description
Use a for loop to output all the numbers from 0 to 9.

Example
```
>>0 1 2 3 4 5 6 7 8 9
Would you like to continue (y/n)? <<y
>>0 1 2 3 4 5 6 7 8 9
Would you like to continue (y/n)? <<y
>>0 1 2 3 4 5 6 7 8 9
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 12

Description
Output all the numbers from 9 to 0. Use a for loop to output all the numbers from 9 to 0.

Example
```
>>9 8 7 6 5 4 3 2 1 0
Would you like to continue (y/n)? <<y
>>9 8 7 6 5 4 3 2 1 0
Would you like to continue (y/n)? <<y
>>9 8 7 6 5 4 3 2 1 0
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 13

Description
Prompt the user for a number. Use a for loop to output all the numbers from that number to 0.

Example
```
>>Enter a number: <<5
>>5 4 3 2 1 0
Would you like to continue (y/n)? <<y
>>Enter a number: <<12
>>12 11 10 9 8 7 6 5 4 3 2 1 0
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 14

Description
Prompt the user for a number. Use a for loop to output the squares of all the numbers from 1 to that number.

Example
```
>>Enter a number: <<2
>>1 4
Would you like to continue (y/n)? <<y
>>Enter a number: <<7
>>1 4 9 16 25 36 49
Would you like to continue (y/n)? <<n
```

EXERCISE 15

Description
Prompt the user for a number. Use a for loop to output the cubes of all the numbers from 1 to that number.

Example
```
>>Enter a number: <<2
>>1 8
Would you like to continue (y/n)? <<y
>>Enter a number: <<7
>>1 8 27 64 125 216 343
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 16

Description

Use a for loop to output a triangle of asterisks with a height of ten.

Example

```
*
**
***
****
*****
******
*******
********
*********
**********
```

EXERCISE 17

Description

Use a for loop to output a triangle of asterisks with a height of ten.

Example

```
                *
              * *
            * * *
          * * * *
        * * * * *
      * * * * * *
    * * * * * * *
  * * * * * * * *
* * * * * * * * *
```

EXERCISE 18

Description
Prompt the user to enter a number. Use a for-loop to calculate the sum of all the numbers from 1 to the number entered.

Example
```
>>Enter a number: <<100
>>5050
Would you like to continue (y/n)? <<y
>>Enter a number: <<20
>>210
Would you like to continue (y/n)? <<n
<<Goodbye!
```

EXERCISE 19

Description
Prompt the user to enter two numbers. Use a for-loop to calculate the sum of all the numbers from the first number entered to the second.

Example
```
>>Enter a number: <<12
>>Enter another number: <<21
<<The sum of all the numbers from 12 to 21 is 165.
Would you like to continue (y/n)? <<y
>>Enter a number: <<3
>>Enter another number: <<5
<<The sum of all the numbers from 3 to 5 is 12.
Would you like to continue (y/n)? <<n
<<Goodbye!
```

EXERCISE 20

Description
Prompt the user to enter a number. Use a for-loop to calculate the product of the number and the two preceding numbers.

Example
```
>>Enter a number: <<6
>>The product of 6, 5, and 4 is 120.
Would you like to continue (y/n)? <<y
>>Enter a number: <<8
>>The product of 8, 7, and 6 is 120.
Would you like to continue (y/n)? <<n
<<Goodbye!
```

EXERCISE 21

Description
Prompt the user to enter a series of words. Once the user is done entering the words, output a sentence containing all the words.

Example
```
>>Enter a word: <<The
>>Would you like to enter another word (y/n)? <<y
>>Enter a word: <<cow
>>Would you like to enter another word (y/n)? <<y
>>Enter a word: <<jumped
>>Would you like to enter another word (y/n)? <<y
>>Enter a word: <<over
>>Would you like to enter another word (y/n)? <<y
>>Enter a word: <<the
>>Would you like to enter another word (y/n)? <<y
>>Enter a word: <<moon.
>>Would you like to enter another word (y/n)? <<n
>>The cow jumped over the moon.
Would you like to continue (y/n)? <<y
>>Enter a word: <<Hello,
>>Would you like to enter another word (y/n)? <<y
>>Enter a word: <<World!
>>Would you like to enter another word (y/n)? <<
>>Hello, World!
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 22

Description

Prompt the user to enter two numbers that will determine a range. Then prompt the user to enter another number and check if it is in the range.

Example

```
>>Enter a number: <<7
>>Enter another number: <<25
>>Your range is 7-25.
Enter a number to verify it is in the range: <<20
>>20 is in the range.
Would you like to continue (y/n)? <<y
>>Enter a number to verify it is in the range: <<32
>>32 is outside the range.
Would you like to continue (y/n)? <<y
>>Enter a number to verify it is in the range: <<7
>>7 is in the range.
Would you like to continue (y/n)? <<n
<<Goodbye!
```

EXERCISE 23

Description

Prompt the user to enter a string. Extract and output the first ten characters of the string.

Example

```
>>Enter some text: <<abcdefghijklmnop
<<The first ten characters were: abcdefghij
Would you like to continue (y/n)? <<y
>>Enter some text: <<Hello, World!
<<The first ten characters were: Hello, Wor
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 24

Description

Prompt the user to enter a string. Extract and output the last ten characters of the string.

Example

```
>>Enter some text: <<abcdefghijklmnop
<<The last ten characters were: ghijklmnop
Would you like to continue (y/n)? <<y
>>Enter some text: <<Hello, World!
<<The last ten characters were: lo, World!
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 25

Description

Prompt the user to enter a sentence. Split the sentence into individual words and display each word on its own line.

Example

```
>>Enter a sentence: <<The cow jumped over the moon.
>>The
cow
jumped
over
the
moon.
Would you like to continue (y/n)? <<y
>>Enter a sentence: <<Hello, World!
>>Hello,
World!
Would you like to continue (y/n)? <n
<<Goodbye!
```

EXERCISE 26

Description

Prompt the user to enter text. Count and output how many vowels were in the string.

Example

```
>>Enter some text: <<abcdefghijklmnopqrstuvwxyz
>>There were 5 vowels.
Would you like to continue (y/n)? <<y
>>Enter some text: <<Hello, World!
>>There were 3 vowels.
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 27

Description

Prompt the user to enter text. Count and output how many consonants were in the string.

Example

```
>>Enter some text: <<abcdefghijklmnopqrstuvwxyz
>>There were 19 consonants.
Would you like to continue (y/n)? <<y
>>Enter some text: <<Hello, World!
>>There were 7 consonants.
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 28

Description

Prompt the user to enter text. Remove all the vowels and output the text.

Example

```
>>Enter some text: <<abcdefghijklmnopqrstuvwxyz
>>bcdfghjklmnpqrstvwxyz
Would you like to continue (y/n)? <<y
>>Enter some text: <<Hello, World!
>>Hll, Wrld!
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 29

Description

Prompt the user to enter text. Remove all the vowels in the middle of the word, but leave any that start or end the word.

Example

```
>>Enter some text: <<Elephants are wonderful!
>>Elphnts are wndrfl!
Would you like to continue (y/n)? <<y
>>Enter some text: <<Is every flake edible?
>>Is evry flke edble?
Would you like to continue (y/n)? <<n
>>Goodbye!
```

EXERCISE 30

Description

Prompt the user to enter text. Reverse the text.

Example

```
>>Enter some text: <<abcdefghijklmnopqrstuvwxyz
>>zyxwvutsrqponmlkjihgfedcba
Would you like to continue (y/n)? <<y
>>Enter some text: <<Hello, World!
>>!dlroW ,olleH
Would you like to continue (y/n)? <<n
>>Goodbye!
```
