01 Prove Milestone: Review Python

Purpose

Prove that you can write a Python program that gets input from a user, performs arithmetic, and displays results for the user to see.

Problem Statement

The size of a car tire in the United States is represented with three numbers like this: 205/60R15. The first number is the width of the tire in millimeters. The second number is the aspect ratio. The third number is the diameter in inches of the wheel that the tire fits. The volume of space inside a tire can be approximated with this formula:

$$v = \frac{\pi\, w^2\, a \left(w\, a + 2{,}540\, d\right)}{10{,}000{,}000{,}000}$$

- v is the volume in liters,
- π is the constant PI which is the ratio of the circumference of a circle divided by its diameter (use `math.pi`),
- w is the width of the tire in millimeters,
- a is the aspect ratio of the tire, and
- d is the diameter of the wheel in inches.

If you're curious about how the above formula was derived, you can read [formula derivation](#).

Assignment

Write a Python program named `tire_volume.py` that reads from the keyboard the three numbers for a tire and computes and outputs the volume of space inside that tire.

Helpful Documentation

- The [prepare content](#) for this lesson explains how to write code to do the following:
    - [Get input](#) from a user
    - [Convert](#) user input from a string to a number
    - [Calculate](#) results
    - [Display](#) results to the user

- The Python [math module](#) contains mathematical constants and functions including [`math.pi`](#).

- This [short video](#) (10 minutes) shows a BYU-Idaho faculty member solving a problem that is similar to this prove assignment.

Testing Procedure

Verify that your program works correctly by following each step in this testing procedure:

1. Run your program and enter the inputs shown below. Ensure that your program's output matches the output below.

```
> python tire_volume.py
Enter the width of the tire in mm (ex 205): 185
Enter the aspect ratio of the tire (ex 60): 50
Enter the diameter of the wheel in inches (ex 15): 14

The approximate volume is 24.09 liters

> python tire_volume.py
Enter the width of the tire in mm (ex 205): 205
Enter the aspect ratio of the tire (ex 60): 60
Enter the diameter of the wheel in inches (ex 15): 15

The approximate volume is 39.92 liters
```

Ponder

During this assignment, you wrote a Python program that gets input from a user, uses variables, performs arithmetic, and displays results for the user to see. Because you should have learned how to write this type of program in CSE 110, this assignment should have been fairly easy for you. If this assignment was difficult for you, you should review the concepts from CSE 110 and the programs that you wrote in that course.

Submission

On or before the due date, return to I-Learn and report your progress on this milestone.