Lab Sheet 1

Simple input-calculate-output programs

Try to complete as many of the following problems as you can during the lab and complete the remainder in your own time. **These exercises will not be submitted or marked, but these serve as practice for the sort of problems that will apear on the midterm and final.**

1. Write a Python program that reads a positive integer n from the user and then displays the sum of all the integers from 1 to n. The sum of the first n positive integers can be computed using the formula:
$$\text{sum} = \frac{n(n+1)}{2}$$

2. Write a complete Python program that asks the user to enter a real number r and calculates and prints the area of the circle with that radius using the formula $a = \pi r^2$. Use 3.14 for the value of π. Don't worry about controlling the number of decimal places in the result.

3. Redo the problem above but using Python's builtin value of π. This is named `math.pi`. In order to use this, you need to load Python's `math` module. This is a body of mathematical capabilities, including a range of functions (trigonometrics, logarithms and so on). In order to use these add the line `import math` to the top of your program. [1]

4. Write a program that reads in a duration of time as a number of days, hours, minutes and seconds and that computes and prints the total number of seconds represented by this duration.

5. Write a program that reads in an integer representing an interval in time expressed in seconds and that outputs the interval length in the format `D:HH:MM:SS`, where `D, HH, MM, SS` represent the number of days, hours, minutes and seconds respectively.

6. Write a Python program to compute the area of a triangle given the length of its three sides based on the following formula:
$$\text{area} = \sqrt{s \times (s - s_1) \times (s - s_2) \times (s - s_3)}$$
where s_1, s_2, s_3 are the three side lengths and $s = (s_1 + s_2 + s_3)/2$. You may use the exponentiation operator $**$ to calculate the square root e.g. $2 ** 0.5$ gives the square root of two. You could also use `math.sqrt`. Bear in mind that not all trios of numbers represent a real triangle, so practice test on values where you know hte answer e.g. $3, 4, 5$.

7. Write a program that reads in three integer values at that outputs them in sorted order (smallest to largest). Hint: functions `min` and `max` compute the minimum and maximum of a set of numbers, respectively.

[1] Refer to `https://docs.python.org/3/library/math.html` for further details of Python's basic maths capabilities.