ENGG1003 - Thursday Week 3

Review of Monday's lecture & overview of Week 4 assessed lab

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Lecture overview

1. Review of Monday's lecture
   - `for` loop
   - `while` loop
   - `if-elif-else`
2. Overview of Week 4 assessed lab
   - review of main topics covered in weeks 1–3
   - what to expect in assessed lab
   - reminder: worth 5% of overall course grade

1) Review of Monday's lecture

Reminder of main ideas in Monday's lecture:

- Iteration using **`for`** loop
  - fixed number of iterations
- Iteration using **`while`**
  - keep iterating whenever a Boolean condition is satisfied
- Branching: **`if`**, **`elif`** and **`else`**
  - conditional execution of code blocks
    - `if`
    - `if-else`
    - `if-elif-else`

Iteration using `for` loop

Example 1:

Write a Python program which uses a **`for`** loop to print the numbers $1, 2, 3, \ldots, 10$ to the console.

Your program should use the basic form of `for` loop

- ie: in loop header, use
  `[1,2,3,4,5,6,7,8,9,10]`

- Live demo

Python code for Example 1

- show code
- screenshot of console output

Example 2:

Modify your solution to Example 1 to use a **`for`** loop to print the *squares* of the numbers $1, 2, 3, \ldots, 10$ to the console using the following display format:

```
1**2 = 1
2**2 = 4
3**2 = 9
4**2 = 16
.
.
.
10**2 = 100
```

- Live demo

Python code for Example 2

- show code
- screenshot of console output

Example 3:

Modify your solution to Example 2 to use a **`for`** loop to print the squares of the numbers $1, 2, 3, \ldots, 1000$ to the console using the display format in Example 2. You *must* use the `range` function in the `for` loop header.

```
1**2 = 1
2**2 = 4
3**2 = 9
4**2 = 16
...
1000**2 = 1000000
```

- Live demo

Python code for Example 3

- show code
- screenshot of console output

Reflections on Examples 1–3

- xxx
- xxx

Iteration using `while` loop

Example 4:

Write a Python program which calculates the sum of the squares of the first N integers:

$$S_N = 1^2 + 2^2 + 3^2 + \cdots + N^2$$

- your program *must* use a `while` loop
- demonstrate your program for $N = 10$
- check your answer is correct using the formula

$$S_N = \frac{N(N+1)(2N+1)}{6}$$

How do we start to solve this problem?

- Don't try and solve the whole problem at once!
- Start small and build up your code one small step at a time
  - ...testing along the way
- Suggested first step: display $1, 2, 3, \ldots, 10$ to the console
  - tests that your `while` loop syntax is correct
- Coding in small steps often helps in better understanding the problem

Python code for Example 4

- live demo—code developed in small stages
- show final code
- screenshot of console output

2) Overview of assessed lab in week 4

1. Python program with library function
2. Simple plotting
3. Simple printing
4. Iterative processing / conditional