ENGG1003 - Thursday Week 3

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

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Lecture overview

- Review of Monday's lecture
 - ▶ if-elif-else
 - ► for loop
 - ▶ while loop
- 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:

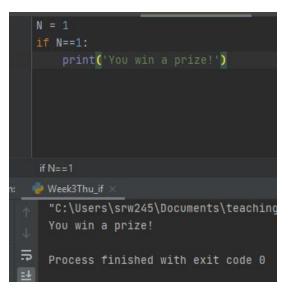
- Branching: if, elif and else
 - conditional execution of code blocks
 - if
 - if-else
 - if-elif-else
- Iteration using for loop
 - fixed number of iterations
- Iteration using while
 - keep iterating whenever a Boolean condition is satisfied

Branching: if

Example 1

Write a Python program which takes an integer $N \in \{1, 2, 3, 4, 5, 6\}$ and displays a message as follows:

- N=1, display "You win a prize!"
- $N \in \{2, 3, 4, 5, 6\}$, no message is displayed



Branching: if-elif-else

Example 2

Write a Python program which takes an integer $N \in \{1, 2, 3, 4, 5, 6\}$ and displays a message as follows:

- N=1, display "You win first prize!"
- N=2, display "You win second prize!"
- $N \in \{3, 4, 5, 6\}$, display "Sorry, no prize"

```
if N==1:
elif N==2:
    print('You win second prize!')
    print('Sorry, no prize')
🦆 Week3Thu ifelif
  "C:\Users\srw245\Documents\teaching
  You win first prize!
 Process finished with exit code 0
```

Iteration using for loop

Example 3

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]

```
print(i)
Week3ThuEx3
 "C:\Users\srw245\Documents\teach
 8
```

Example 4

Modify your solution to Example 3 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

```
print('{}**2 = {}'.format(i,i**2))
for i in [1,2,3,4,5,6,7,8,9,10]
■ Week3ThuEx4
 "C:\Users\srw245\Documents\teaching so
 1**2 = 1
 2**2 = 4
 3**2 = 9
 4**2 = 16
 5**2 = 25
 6**2 = 36
 7**2 = 49
 8**2 = 64
 9**2 = 81
 10**2 = 100
```

Example 5

1**2 = 1

Modify your solution to Example 4 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 4. You *must* use the range function in the for loop header.

$$2**2 = 4$$
 $3**2 = 9$
 $4**2 = 16$
...
 $1000**2 = 1000000$

```
for i in range(1,1001],1):
    print('{}**2 = {}'.format(i,i**2))
```

```
994**2 = 988036
995**2 = 990025
996**2 = 992016
997**2 = 994009
998**2 = 996004
999**2 = 998001
1000**2 = 1000000
```

Iteration using while loop

Example 6

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

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

- 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

```
N = 20;
i = 1
sum = 0
ywhile i <= N:
    print(i**2)
    sum = sum + i**2
i = i + 1

print('sum = {}'.format(sum))
print('S_N = {}'.format(N*(N+1)*(2*N+1)/6))</pre>
```

```
196
225
256
289
324
361
400
sum = 2870
S_N = 2870.0
```

2) Overview of assessed lab in week 4

- Python program with library function
- Simple plotting
- Simple printing
- Iterative processing / conditional