CT60A0203
Introduction to Programming: Python
Week 3

Learning objectives: Selection / Conditional statements

- To know selection statements in Python programs: if..else
- To use comparison operators for decision making statements
- To learn nesting multiple selection statements: if.. elif.. else
- To write expressions using the comparison statements with logical operators
- To know menu-based coding using if.. elif.. else

At the conclusion of this lecutre, students will be able to understand the role of decision statements in programming. In addition, they know how to handle comparison and logical operators for multiple decision-based coding.

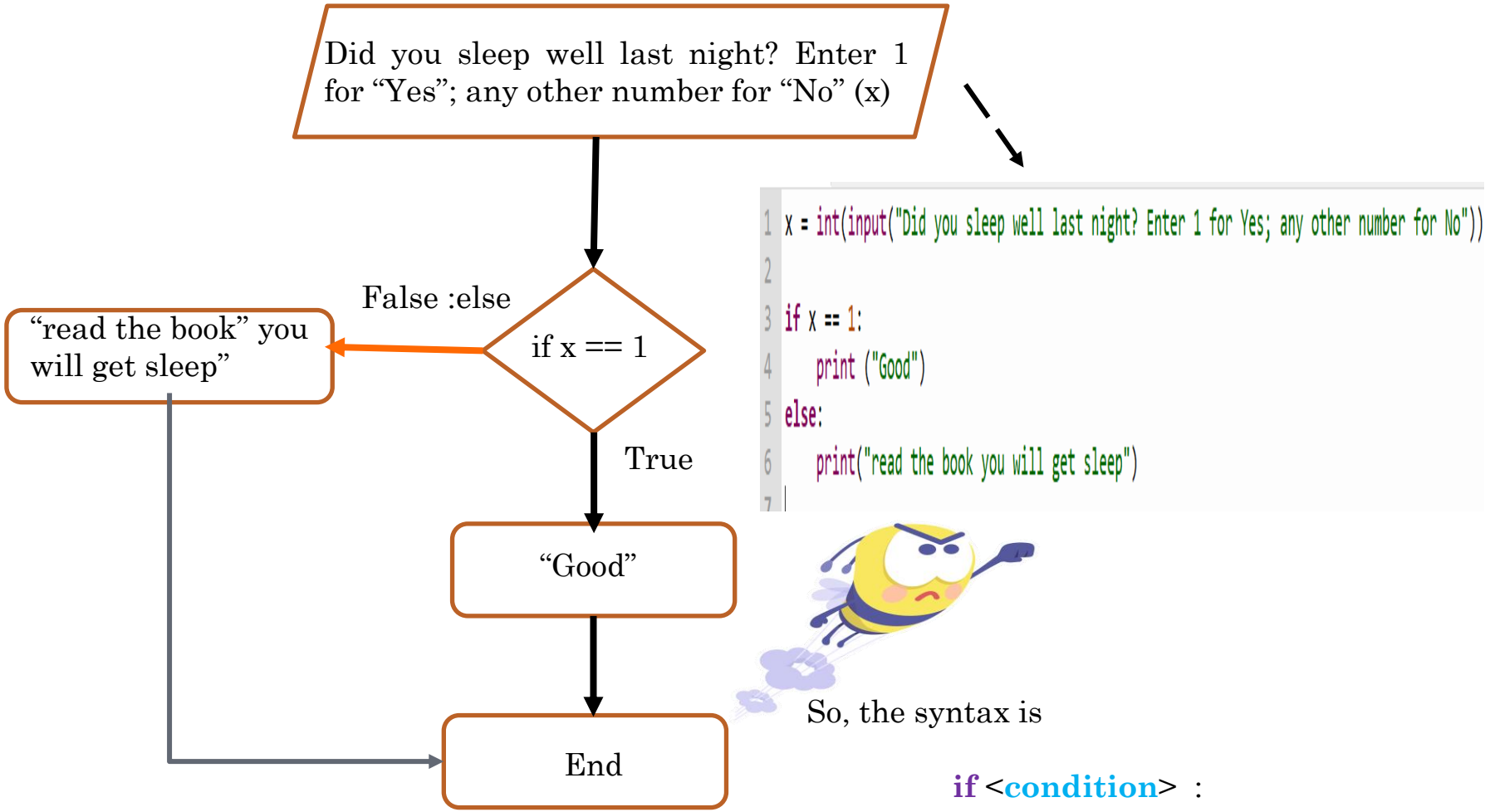
- **Selection statements**
- **Example scenario**
- Did you sleep well last night? Enter 1 for “Yes”; any other number for “No”
-
-

- **What do you want to drink** (1 for coffee; 2 for tea; other number to exit?)

- **Are you eligible to pass the course?**
- Yes, **if you secured 50%** or more in weekly assignment, tutorial attendance, Quiz, and final exam. **Else NO**.

- **Withdraw money from ATM machine?**
- If your withdrawal amount is less than available balance in your account, then it is possible. Else- “Sorry! you cannot withdraw money”.
-

- **How decision statements work? : Did you sleep well yesterday?**




```
x = int(input("Did you sleep well last night? Enter 1 for Yes; any other number for No"))

if x == 1:
    print ("Good")
else:
    print("read the book you will get sleep")
```


So, the syntax is

```
if <condition> :
        <statement1>
else:
        <statement2>
```

If the condition is **True** statement1 will be executed **else** statement2 will be executed.

Comparison operators in Python

== check both are equal → if a == b

!= not equal to → a != b

< less than → if a < b

<= less than or equal to → if a <= b

> greater than → if a > b

>= greater than or equal to → if a >= b

```
xample_if2.py
1  #program for computing area of the circle
2  import numpy
3  r = int(input("Enter the radius value:"))
4
5  if r >=1:
6      areaCircle = numpy.pi *(r**2)
7      print ("The area of the circle is : ",areaCircle)
8  else:
9      print("Radius value is ZERO or below")
10
11
```

```
hell
>> %Debug example_if2.py

Enter the radius value:0
Radius value is ZERO or below
>> %Run example_if2.py
Enter the radius value:4
The area of the circle is :  50.26548245743669
>>
```

Attention: This code uses numpy library for calling PI value. If you are using IDLE, then numpy library must be installed before trying this code.

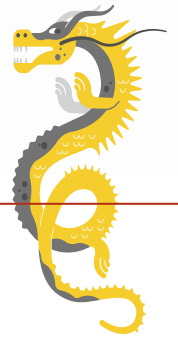
In the command prompt →
py –m pip install numpy

For Thonny users :
Select Tools menu → manage packages → type numpy in the search box and install it.

```
#-----------------------
#checking if the number is odd or even
x = int(input("enter any integer number: "))

if x%2 == 0:
    print("x is even number")
else:
    print("x is odd number")
```

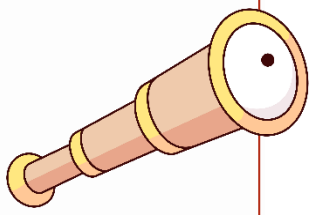
What is the output?

```
#-------------------------
#checking positve or negative or zero
x = int(input("enter any integer or zero "))
if x==0:
    print("x is ZERO")

elif x>0:
    print("x is positive")

else:
    print("x is negative")
```



example_if3.py

```
1  #computing course grade based on final score
2  fs = float(input("Enter your final score in %:"))
3
4  if fs<50:
5       print ("N/A")
6
7  elif fs<60:
8       print ("D")
9
10 elif fs<70:
11      print ("C")
12
13 elif fs<80:
14      print ("B")
15
16 else:
17     print ("A")
```



Shell

```
>>> %Run example_if3.py
  Enter your final score in %:78
  B
>>> %Run example_if3.py
  Enter your final score in %:93
  A
>>> %Run example_if3.py
  Enter your final score in %:55
  D
>>> %Run example_if3.py
  Enter your final score in %:67.5
  C
```

So, the syntax is : if– elif.. else

```
if <condition1> :
    <statement1>
     <statement1a>
      ----
elif <condition2> :
    <statement2>
     <statement2a>
     ------
elif <condition3> :
    <statement3>
     ---

 else:
     <statement..>
```

- **How about joining more than one conditions?**
- Eligibility to **sit for final exam**: student should get 50% or more in Quiz (input 1), weekly assignment (input 2), and project work (input 3), respectively.
- Possible total scores for Quiz → **500**, Weekly assignment → **800** and project work → **100**

yourAge.py

```
1  # To attend final exam eligibility program
2  quiz = int(input("Enter your Quiz scores [0-500]: "))
3  wa = int(input("Enter your Weekly assignment scores [0-800]: "))
4  pj = int(input("Enter your prject work scores [0-100]: "))
5
6  if quiz>=250 and wa >=400 and pj>=50:
7      print ("Congrats you are eligible to attend the final exam")
8
9  else:
10     print ("you can't attend the final exam")
11
```

Shell

```
Python 3.7.9 (bundled)
>>> 123%10
3
>>> %Run yourAge.py
  Enter your Quiz scores [0-500]: 300
  Enter your Weekly assignment scores [0-800]: 400
  Enter your prject work scores [0-100]: 50
  Congrats you are eligible to attend the final exam
>>> %Run yourAge.py
  Enter your Quiz scores [0-500]: 245
  Enter your Weekly assignment scores [0-800]: 500
  Enter your prject work scores [0-100]: 90
  you can't attend the final exam
>>> %Run yourAge.py
  Enter your Quiz scores [0-500]: 450
  Enter your Weekly assignment scores [0-800]: 350
  Enter your prject work scores [0-100]: 100
  you can't attend the final exam
>>>
>>> %Run yourAge.py
  Enter your Quiz scores [0-500]: 500
  Enter your Weekly assignment scores [0-800]: 745
  Enter your prject work scores [0-100]: 30
  you can't attend the final exam
>>>
```

Logical operators in Python

and check both conditions are true
→ if a == b and a ==c

or check if either of conditions are true
→ if a == b **or** a==c

not check if either of conditions are false
→ if a == b **and** not(a == c)

Menu based coding

- **Scenario**
- Write a program to prompt the user to enter any two numbers as input and perform the arithmetic calculations based on user choice.

example_if3.py | example_if4.py

```
1  #Simple menu based coding
2  print ("Welcome to arithmetic calculations")
3  print (" 1. Addition\n","2. Subtraction\n", "3. Multiplication\n","4. Division\n","5. Exit\n")
4  option = int(input("Select your option [from 1 - 5]"))
5
6  if  option<1 or option>=5:
7      print ("Bye Bye")
8  else:
9      a = float(input("Enter the first number: "))
10     b = float(input("Enter the second number: "))
11
12 if option == 1:
13     print("a+b =",a+b)
14
15 if option == 2:
16     print("a-b =",a-b)
17
18 if option == 3:
19     print("a*b =",a*b)
20
21 if option == 4:
22     print("a/b =",a/b)
```

- 1- Addition
- 2- Subtraction
- 3 – Multiplication
- 4. Division
- 5. Exit

Shell

```
Welcome to arithmetic calculations
 1. Addition
 2. Subtraction
 3. Multiplication
 4. Division
 5. Exit

Select your option [from 1 - 5]4
Enter the first number: 50
Enter the second number: 5
a/b = 10.0
```

Let us analyze some example programs

What is the printout of code in (a) and (b) if number is 30 and 35 respectively?

(a)

```
if number%2 == 0:
    print (number, "is even")
print (number, "is odd")
```

(b)

```
if number%2 == 0:
    print (number, "is even")
else:
    print (number, "is odd")
```

```
x = 1
y = -1
z = 1

if x>0 and y>0:
    print ("x>0 and y>0")
elif z>0:
    print ("x>0 and z<0")
```

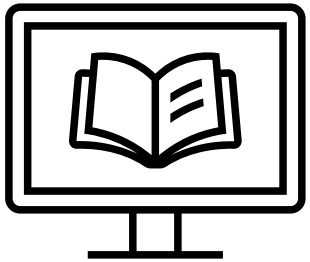
What is the output of the code?

moodle QUIZ

Quiz 1 syllabus:

Week 1 and Week 2's

- **lecture notes, (Moodle → lectures)**
- **weekly assignments (Moodle → Weekly programming assignment)**
- **practice exercises and (Moodle → practice exercises)**
- **first two chapters of prescribed textbook (Moodle → learning resources)**



Type of questions (and or in the combination of):

- **Multiple choice**
- **Complete missing code**
- **Yes or no**
- **Short answer**
- **Find the error or output of given code**

When will it be conducted? → during tutorial sessions of Week 3

Duration: 15 – 30 minutes (maximum 3 attempts)

Possible total number of questions: 10-15
Possible total score : 100