

Introduction to Programming: Python

Selection (if statements)

Basic If

```
# if1.py
# Basic If example
mark = int(input("What is your mark? "))

if mark >= 50:
    print ("You Pass")
else:
    print ("You fail")
```

The spacing matters. The print statements **MUST** be indented. I will always use one tab per indent level.

Most languages do not care about spacing.

The selection statement is a fundamental component of any programming language. In general terms it looks like:

```
if <condition> :
    <true branch>
else:
    <false branch>
```

<condition>

A condition is really an expression. It is a Boolean expression. bool is a type in Python that only has two values, True and False. So our condition simply evaluates to True or False. The basic Boolean operators are:

Expression	Description (true if)
<code>x == y</code>	x and y have the same value
<code>x < y</code>	x is less than y
<code>x > y</code>	x is greater than y
<code>x <= y</code>	x is less than or equal to y
<code>x >= y</code>	x is greater than or equal to y
<code>x != y</code>	x is not equal to y
<code>x is y</code>	x and y are the same object (advanced stuff, we will examine later)
<code>x is not y</code>	x and y are different objects (advanced stuff, we will examine later)
<code>x in y</code>	x is an element of y (e.g. 'x' in name)
<code>x not in y</code>	x is not an element of y (e.g. 'f' not in "way")

Given the following initial values, determine the values of the following Boolean expressions

x = 25

y = 50

x == y	_____
x < y	_____
x == y/2	_____
12 >= y/4	_____
x != y	_____

if ... elif

```
# if2.py
# Basic If example
```

```
mark = int(input("What is your mark?"))
print ("That's a letter ", end = ' ')#will force next print to be on same line
if mark >= 80:
    print ("A")
elif mark >= 70:
    print ("B")
elif mark >= 60:
    print ("C")
elif mark >= 50:
    print ("D")
else:
    print ("F")
```

elif – This is supposed to read like "else if", meaning if the previous condition was false and this new condition is true.

Only One Branch will execute: It is important to note that even if mark is 90, it will only print "A", even though 90 is > 70 as well.

if

```
# if3.py
# Basic If example
```

```
date = input("When is your birthday (mm/dd)? ")

if date == "09/23":
    print ("Hey, that's mine too")

print ("Maybe we'll have a party at school that day!")
```

This example makes one very simple point. You do not **need** an else branch.

Branches can have as many lines as you like in them

```
# if4.py
# Demonstrating a more complicated if structure. This is a simple program
# that computes the area of one of three shapes, a rectangle, a circle or a
# triangle

shape = input("What shape(rectangle,circle,triangle)? ")

if shape == "rectangle":
    length = int(input("Length:"))
    width = int(input("Width:"))
    area = length * width
    print ("The area is", area)
elif shape == "circle":
    radius = int(input("Radius:"))
    area = 3.141592 * radius ** 2
    print ("The area is", area)
else:
    height = int(input("Height:"))
    width = int(input("Width:"))
    area = height * width / 2.0
    print ("The area is", area)
```

Using and / or

```
# if4.py
# At McKenzie's Movie House we've found that kids 11-13 cause 90% of the
# problems, and their presence actually turns away other paying customers.
# Although it's illegal to refuse them entrance, we've come up with a
# pricing scheme that should encourage them to go elsewhere.
#   0 - 10      7.99
#   11 - 13     15.99
#   14 +        7.99

print ("Welcome to McKenzie's Movie House".center(40,"-"))
print ("="*40)

age = int(input("How old are you? "))

if age >= 11 and age <= 13:
    print ("That will be 15.99")
else:
    print ("That will be 7.99")
```

A condition with and / or is called a compound condition.

Truth Tables

and	T	F
T	T	F
F	F	F

or	T	F
T	T	T
F	T	F

For example

True and True => True
True and False => False
False and False => False

True or True => True
True or False => True
False or False => False

Given the Following Values for the variables fill in the values for the condition
age = 16 money = 20.50 name = "Vincent"

age > 15 and age < 20 _____
age > 15 and money > 50 _____
age < 10 or age > 20 _____

name == "Vincent" and age > 10 _____
"in" in name or "out" in name _____
name >= "A" and name <="Z" _____

A Python feature that isn't in most languages is that you can write ranges the way you do in Math class. So, you can write

x > 10 and x < 20 as
10 < x < 20

Selection Exercises

- 1) Write a program that asks the user to input a number. Output if that number is positive (≥ 0) or negative.
- 2) Write a program that asks the user to input their age. Output if their age is more than 20, 20 or less than 20.
- 3) Write a program that asks the user to input the dimensions of a rectangle. Output if the area of that rectangle is greater than the perimeter, less than the perimeter or equal to the perimeter.
- 4) In Ontario we have retail sales tax on fast food purchases. The tax rate is 13% on the meal purchased and only charged when the price of the meal is over \$4.00. Create a program that gets the base price of a meal and outputs the total after tax.

Enter the price of the meal==> \$12.89

McD's
Receipt

Meal	\$12.89

Tax (13%)	\$ 1.68

TOTAL	\$14.57

- 5) The postage you pay to send a letter from Canada depends on where you are sending it. For a standard sized letter the postage rates are:

Mailing within Canada \$0.85

Mailing to USA \$1.20

Mailing Internationally \$2.50

Create a program that asks the user where he/she is mailing their letter then tell him/her how much the postage is.

- 6) When building an enclosure for a python (the snake, not the computer language) the amount of area at the base of the enclosure should be proportionate to the length of the snake. The minimum needed is $1/2$ square foot for each foot in length up to and including 6 and $3/4$ square foot for each foot after that.

e.g. 9' python needs 5.25 square feet ($6 * 1/2 + 3 * 3/4$)

Create a program that asks the user how long their python is and tell them the minimum area they need for the base of its enclosure.