הטכניון
היחידה ללימודי המשך
ולימודי חוץ עייש עזריאלי

Conditional Execution

TECHNION
Azrieli Continuing Education and
External Studies Division

Agenda

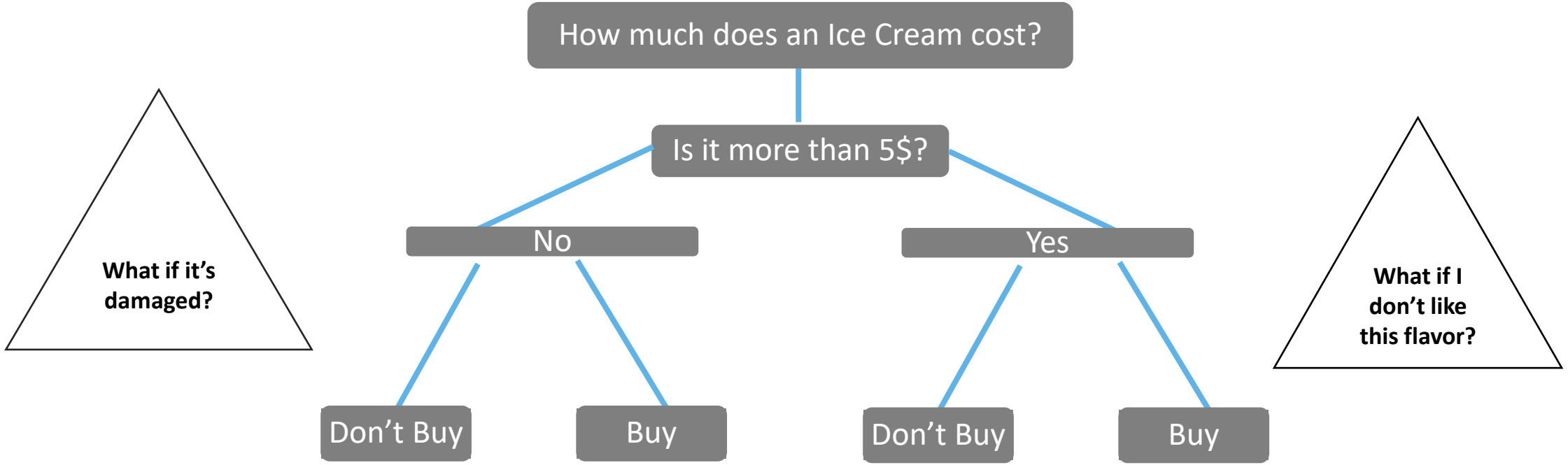
- Decision Making
- If Statement
- Else Statement
- Elif Statement
- Operators

Conditional Execution

- Conditional execution controls whether a specific-block of code will be executed or not.
- To write useful programs, we almost always need the ability to check conditions and change the program's behavior accordingly!

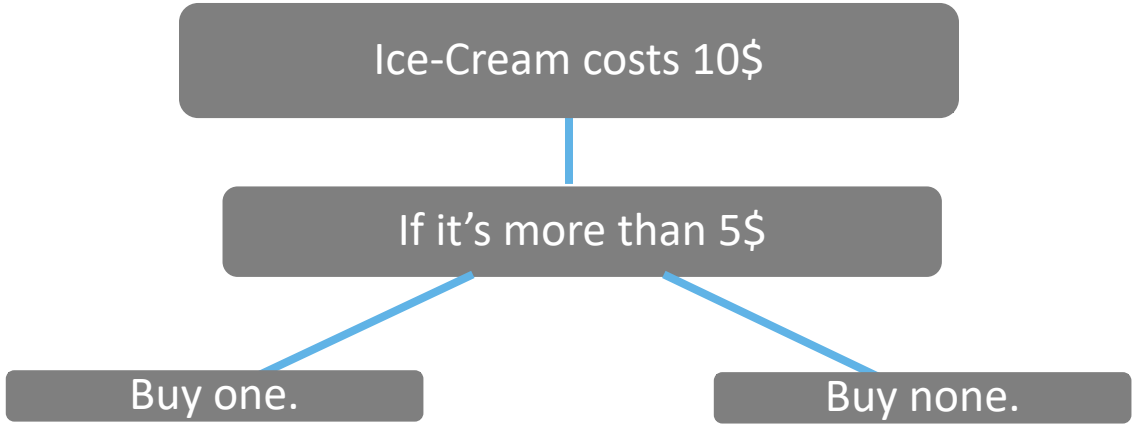
Decision Making

- In modern programming, **Decision Making** is required in almost every script.
- **Decision Making** statements are used when we want a set of instructions to be executed in one situation and different instructions in another.



IF Statement

- The ***if*** Statement is used in Python for Decision Making.
- The ***if*** Statement helps us to evaluate a *Boolean Expression* and determine which code will be executed, respectively.



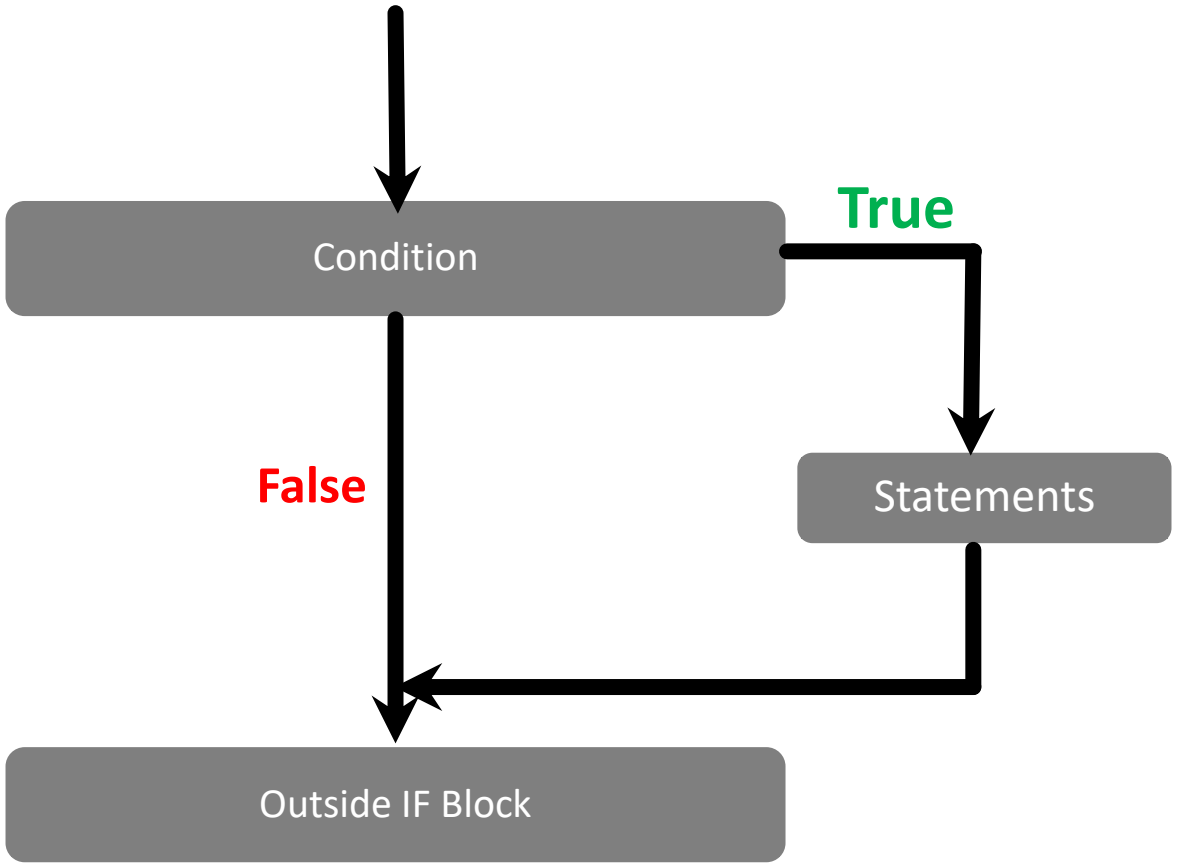
IF Statement - Syntax

if (*BOOLEAN EXPRESSION*):
STATEMENTS

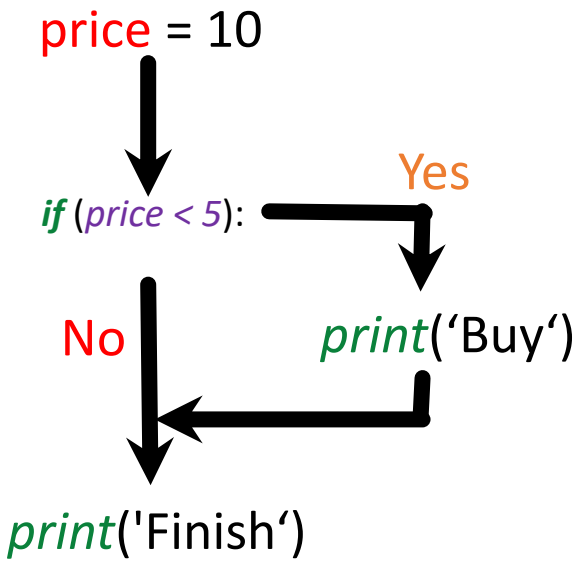
- The colon (**:**) is **significant** and **required**.
- The line after the colon **must** be indented. (4 Spaces)
  - Python 3 disallows mixing the use of tabs and spaces for indentation.
- All lines indented the same amount after the colon will be executed whenever the *Boolean Expression* is ***true***.
- The *Boolean Expression* is called the ***Condition*.**

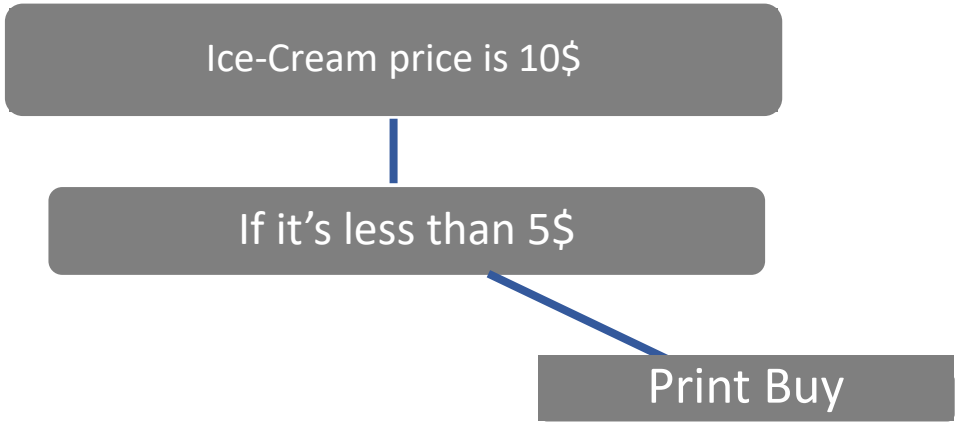
IF Statement – Flow Chart

- If the *Boolean Condition* is *true*; then all the indented statements get executed.
- If the *Boolean Condition* is *false*. Then all the indented statements will **not** execute.



IF Statement





Program:

```
price = 10
if (price < 5):
   print(‘Buy’)

print('Finish‘)
```

The IF Statement

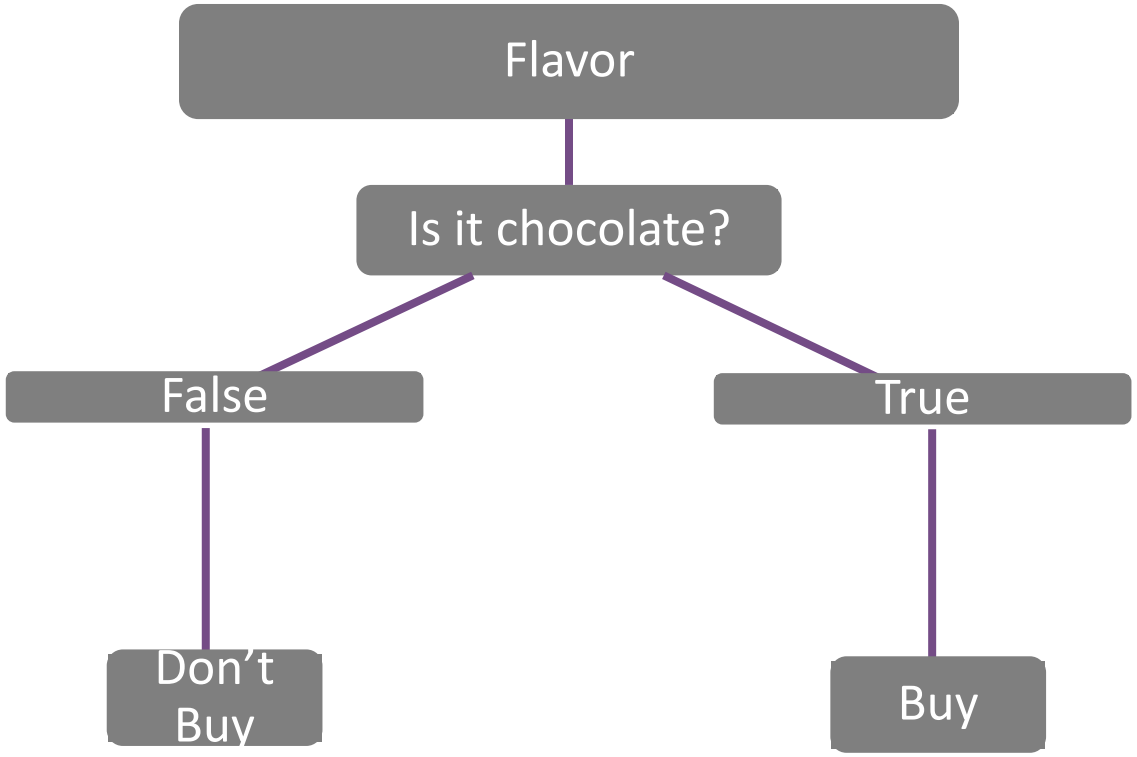
```
x = 5
if x == 5:
    print('Equal to 5‘)
if x > 4:
    print('Greater than 4‘)
if x >= 5:
    print('Greater than or equal to 5‘)
if x < 6:
    print('Less than 6‘)
if x <= 5:
    print('Less than or equal to 5‘)
if x != 6:
    print('Not equal to 6‘)
```

```
Equal to 5
Greater than 4
Greater than or equal to 5
Less than 6
Less than or equal to 5
Not equal to 6
```

Else Statement

- •The *Else* Statement is used when we want to execute a particular code when our *Boolean Condition* **does not** match our condition.
- •Unlike the *If* Statement, which executes code if the *Boolean Condition* returns as **true**, the *Else* Statement can react to a false *Boolean Condition.*

- Else Statement



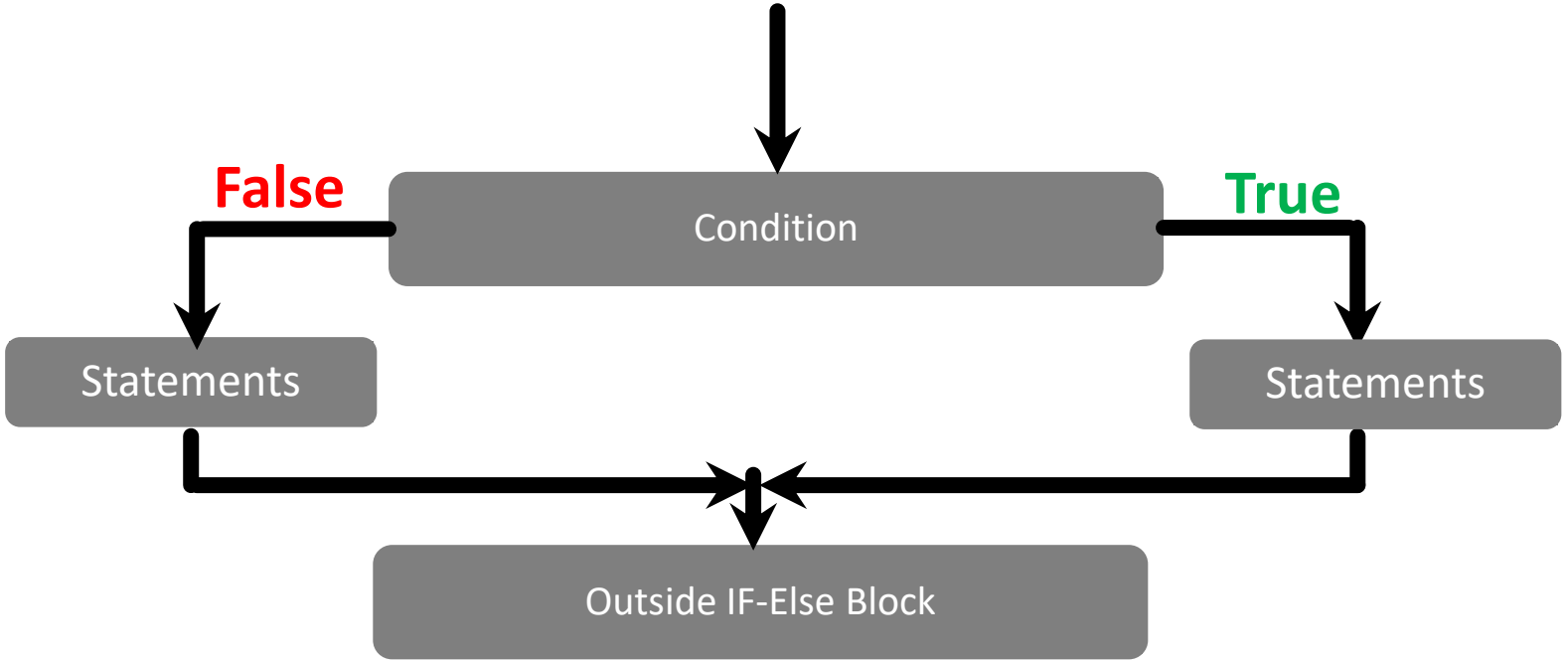
Else Statement - Syntax

```
if (BOOLEAN EXPRESSION):
        STATEMENTS
else:
        STATEMENTS
```

- The colon (**:**) is **significant** and **required**.
- The line after the colon **must** be indented. (4 Spaces)
- All lines indented the same amount after the colon will be executed.

Else Statement – Flow Chart

- If the *Boolean Expression* returns as **false**, the entire block of ***If*** Statements is skipped.
- If the *Boolean Expression* returns as **true**, the entire block of ***Else*** Statements is skipped.



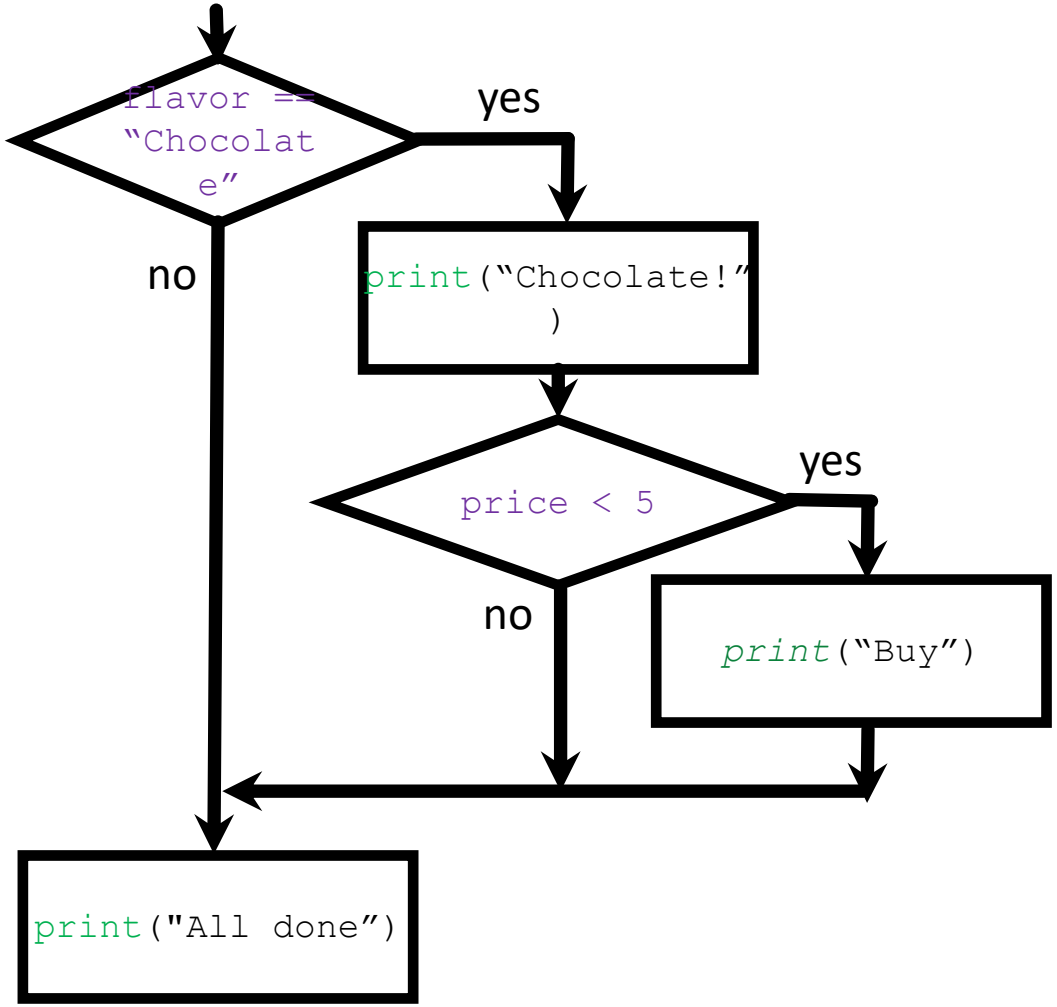
Nested Conditions

- An *If* Statement <u>inside</u> an *If* Statement is called a **Nested Condition**.

```
flavor = "Chocolate"
price = 10

if (flavor == "Chocolate"):
    print("Yes!")
    if (price < 5):
        print("Buy")

print("All done")
```



Else If Statement

- The *Else If* Statement serves its purpose when we want to execute specific code when our *Boolean Condition* does not match our previous condition, but it might match a new one.
- Sometimes there are more than two possibilities, and we need more than one condition.
- Using an *Else If* Statement is useful to avoid excessive indentation.
- The keyword '*elif*' is short for '*Else If*.'

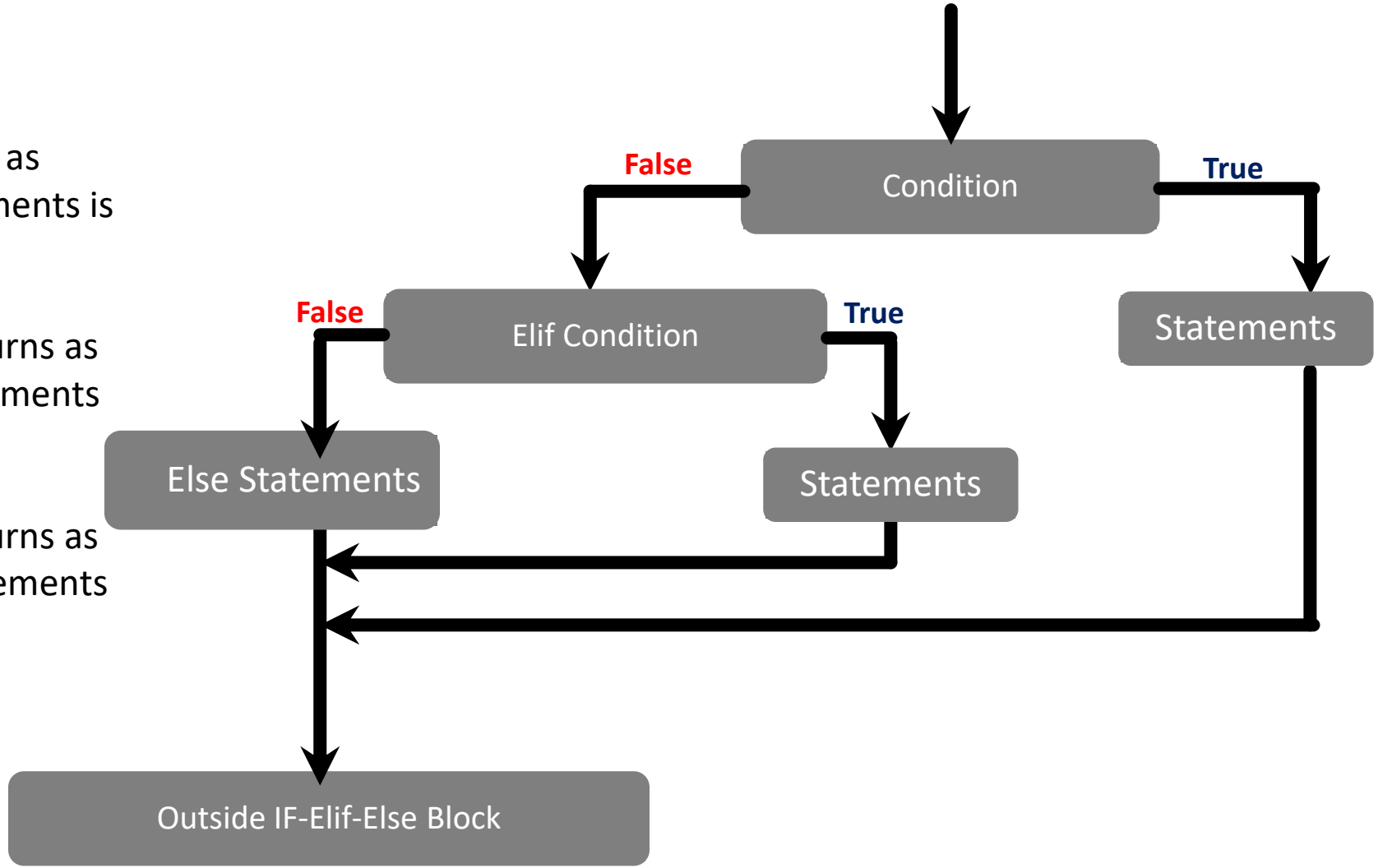
Elif Statement - Syntax

```
if (BOOLEAN EXPRESSION):
        STATEMENTS
elif (BOOLEAN EXPRESSION):
        STATEMENTS
else:
        STATEMENTS
```

- The colon (**:**) is **significant** and **required**.
- The line after the colon **must** be indented. (4 Spaces)
- All lines indented the same amount after the colon will be executed.

• Elif Statement – Flow Chart

- If the *Boolean Expression* returns as **false**, the entire block of *If* Statements is skipped.
- If the *Elif Boolean Expression* returns as **true**, the entire block of *Elif* Statements is executed.
- If the *Elif Boolean Expression* returns as **false**, the entire block of *Elif* Statements is skipped.

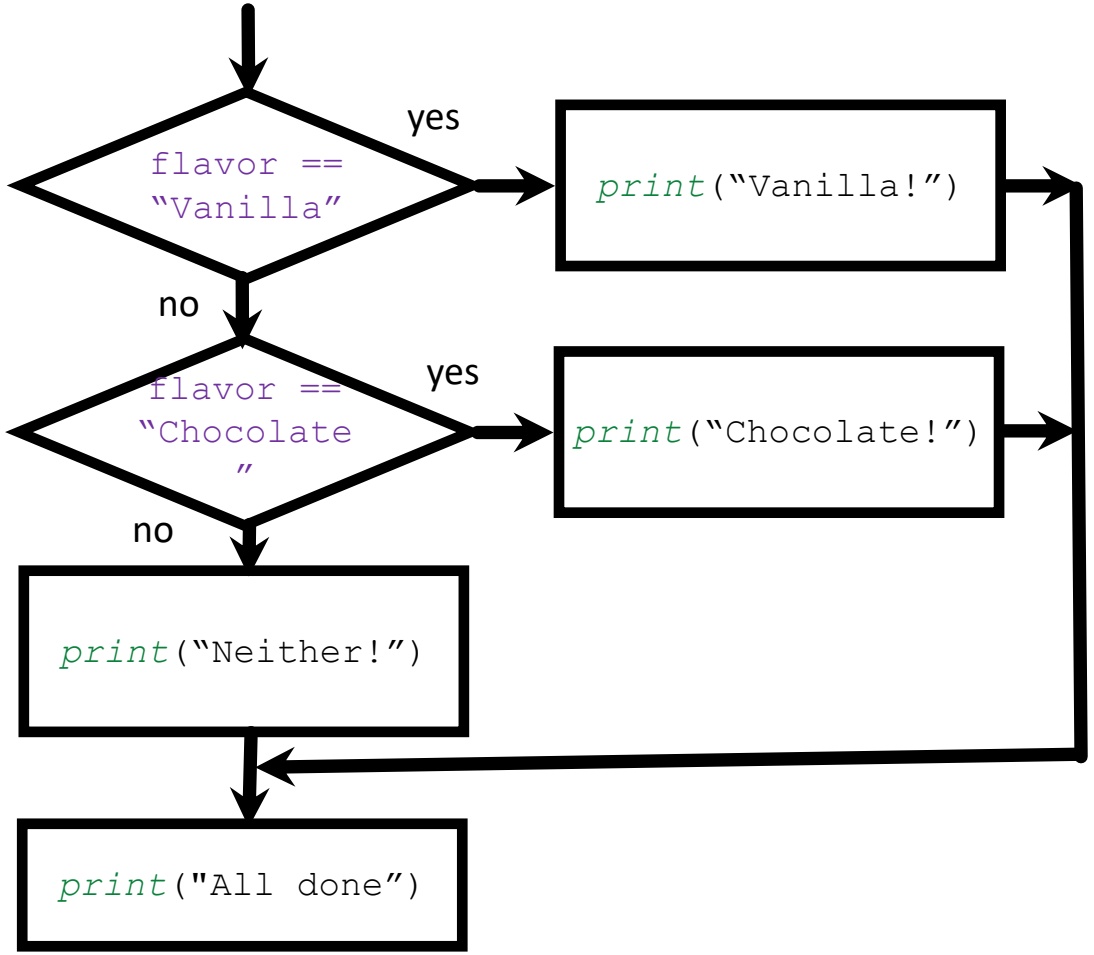


- Elif Statement

```
flavor = “Chocolate”

if (flavor == “Vanilla”):
     print(“Vanilla!”)
elif (flavor == “Chocolate”):
       print(“Chocolate!”)
else:
       print(“Neither!”)

print("All done”)
```



Logical Operators

- Logical Operators are used to combining conditional statements.
- If an operator acts on a single variable. It is called **a unary** operator.
- If an operator acts on two variables. It is called **a binary** operator.

Operator	Type	Description	Example
and	Binary	Returns True if both statements are true	(x < 5) ***and*** (x < 10)
or	Binary	Returns True if one of the statements is true	(x < 5) ***or*** (x > 10)
not	Unary	Reverse the result, returns false if the result is true	***not*** (x<5)

- Logical Operators - Explained

- 1 = True
- 0 = False

AND	OR	NOT

A	B	A AND B
0	0	0
0	1	0
1	0	0
1	1	1

conjunction

$A_{AND}B = A \cdot B = AB$

A	B	A OR B
0	0	0
0	1	1
1	0	1
1	1	1

disjunction

$A_{OR}B = A + B$

A	NOT A
0	1
1	0

negation

$_{NOT}A = \sim A = A' = \overline{A}$

AND is 1 if **both inputs** are **1**.

OR is 1 if **one ore more** of the inputs are **1**.

NOT is 1 **only** if the input is 0.

The *in* Operator

- The *in* operator returns **True** if the first operand is contained within the second, and **False** otherwise!
- There is also a *not in* operator, which does the opposite!

Order of Logical Operator Assessment

- **NOT** will always happen first, then **AND**, then **OR**.
- The use of ***parentheses* - ()**, can change this order.
- **Always** use parentheses, so that the individuals code is more readable, *even when they are not needed*.

```
>>> not False and True
True
```

```
>>> True or True and False
True
>>> (True or True) and False
False
```

Boolean Values of Variables

- Any “empty” variables are *False*.
- Any variables *with* “content” are *True*.

- **Q:** *What is an “empty” integer?*
  - **A:** *0*
- **Q:** *What is an “empty” string?*
  - **A:** *“”*

```
>>> bool(0)
False
>>> bool(3)
True
>>> bool("")
False
>>> bool("Hello!")
True
```

Boolean Values in Conditions

- In a condition, the casting of a variable/statement to a Boolean is redundant, so it is best practice to remove the *bool*() casting altogether.

```
>>> if 0:
        print("This should not be printed")


>>> x = "A full string"
>>> if x:
        print("Non-empty strings are True!")


Non-empty strings are True!
>>>
```

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Summary

- ✓Decision Making
- ✓If Statement
- ✓Else Statement
- ✓Elif Statement
- ✓Operators

Thank you

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