Lesson 5: Conditionals

If statements

The basis of all programs is LOGIC. We use logic to control how computers behave in different scenarios. The most basic form of logic in programming are **if statements**. For example:

```
num = 1
if num == 1:
    print(num)
```

1. We use the **if** keyword to check conditions
    a. In this case we check if the variable *num* is equal to 1
    b. NOTICE that inside the condition, we use the double equals (**==**) operator to check if two things are equal
2. At the end of the line with the if statement, we put a colon (**:**). This signifies the beginning of inner code—code that will only run if the condition checked is true.
3. NOTICE that the code inside the if statement is *indented*. In Python, **INDENTATION IS CRUCIAL**.

Will this program print out 1?

Exercise 1
What will the following code output?

```
num = 1
if num == 2:
    print(num)
```

Exercise 2
What will the following code output?

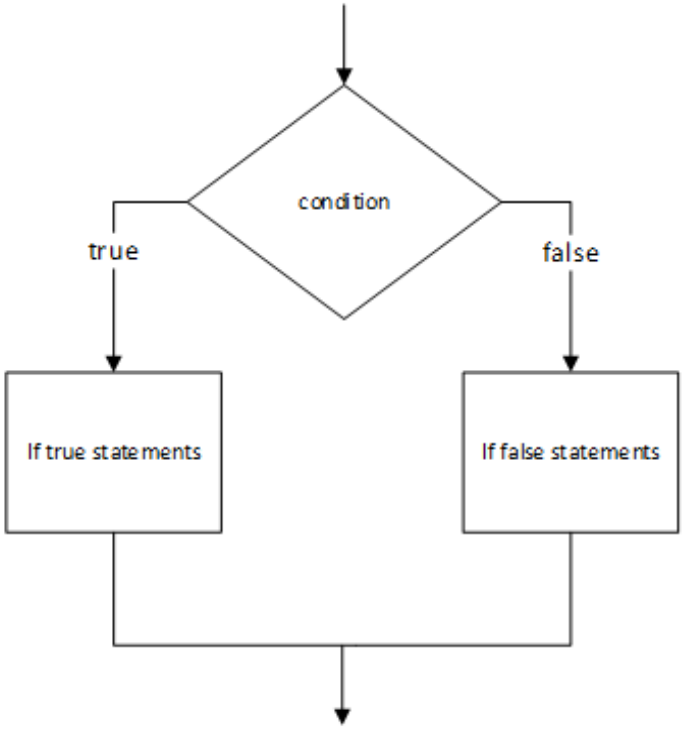
```
num = 1
if num == 1:
    num = 2
print(num)
```

Exercise 3
Create a program that takes in two inputs and outputs “Good job!” if they are equal.

If… else…

In addition to if statements, which check when a condition is true, you may want to perform different actions when the condition is not true.

The paradigm goes something like this:



With an if else statement, code can do two separate actions based on whether a condition is true.
For example:

```
x = 3
if x == 1:
    print("Good job!")
else:
    print("Wrong!")
```

1. Notice that the ***else*** keyword is followed by a colon (**:**), just like the end of an if statement
2. Code inside the else block is also indented in a similar fashion

What would the code above output?

Exercise 4
Create a program that asks for a password and checks if it equals “supersecretpassword”

- If it does, output “Correct!”
- Else, output “Incorrect!”

For example:

```
pschwendy@Peters-MacBook-Pro Lesson 5 % python password.py
What's the password? supersecretpassword
Correct!
pschwendy@Peters-MacBook-Pro Lesson 5 % python password.py
What's the password? abcdefg
Incorrect!
pschwendy@Peters-MacBook-Pro Lesson 5 %
```

Comparison Operators

Example
Create a program that asks for a number

- If the number is greater than 5, output “Hooray!”
- Otherwise, output “Boohoo”

In addition to the **==** comparison, we can also compare values with other operators. Here are a few:

- Equal (**==**) — checks if two values are equal to each other
- Not Equal (**!=**) — checks if two values are not equal to each other
- Less than (**<**) — checks is one value is lower than another
    - Like an inequality ($x < 10$)
- Greater than (**>**) — checks if one value is greater than another
- Less than or equal to (**<=**) — checks if one value is less than or equal to another
    - The code equivalent to something like **≤**
- Greater than or equal to (**>=**) — checks if one value is greater than or equal to another

Exercise 5
Create a program that asks for a number

- If the number is not equal to 1, print “Good choice”
- Else, print (Bad choice)

Extended IF Statement

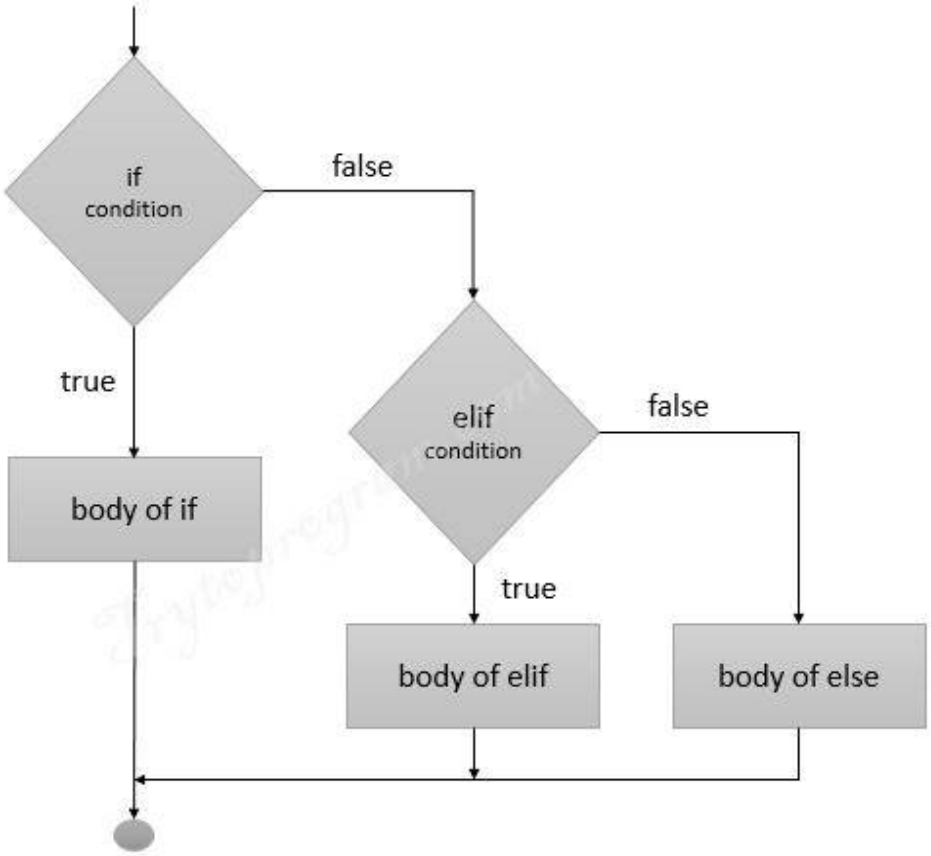
What happens if you want to check another condition after the initial if condition? We use the **elif** (else if) statement. If used with elif forms an extended if statement.

Let's say we want to give a different greeting depending on the time of day. We'll have to check multiple conditions:

```
if hour > 18:
    greeting = "Good evening!"
elif hour > 12:
    greeting = "Good afternoon!"
elif hour > 6:
    greeting = "Good morning!"
else:
    greeting = "GO TO SLEEP!"
```

1. Notice how use the **elif** statement to check conditions in case the initial condition is false
2. Let's walk through the logic:
    a. IF the hour is greater than 18 →we set greeting = "Good evening!"
    b. ELSE IF the hour is NOT greater than 18, but greater than 12 →we set greeting = "Good afternoon!"
    c. ELSE IF the hour is NOT greater than 18 or greater than 12, but greater than 6 →we set greeting = "Good morning!"
    d. ELSE (none of the conditions are true) → we set greeting = "GO TO SLEEP!"

Here's the model for the logic behind elif:



Exercise 6

Create a program that outputs a letter grade based on a given score.

1. An **A** is given if the grade is ≥ 90
2. A **B** is given if the grade is ≥ 80 but < 90
3. A **C** is given if the grade is ≥ 70 but < 80
4. A **D** is given for grades ≥ 60 but < 70
5. An **E** given for grades < 60

Hint: Use the structure of the extended if statement