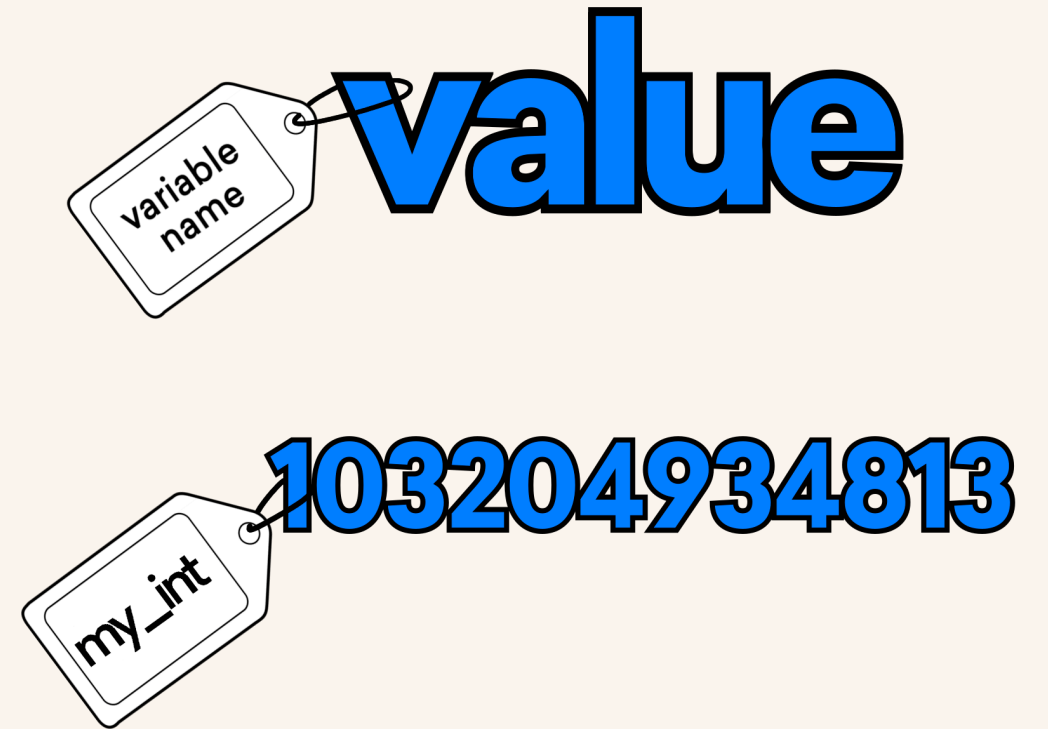
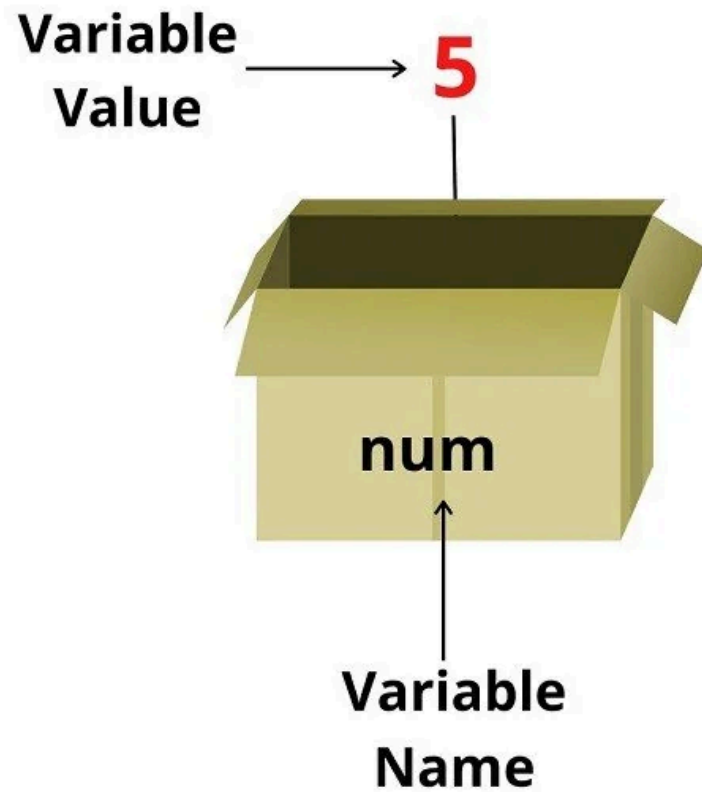


Control: conditionals

Recap

- function/argument/side effect/return value
- variable & data types (str/int/float)
- string methods



Scope 🤔

```
def func1():  
    x = 10  
    y = 20  
    print(x + y)
```

```
def func2(y):  
    x = 30  
    print(x + y)
```

```
func1()
```

```
func2(2)
```

```
x = 20  
func2(x)
```

◀ Recap: 8. Personalized Introduction 3

```
def main():
    # Ask for user input
    name = ask_name()
    birthyear = ask_birthyear()
    birthyear_int = int(birthyear)

    # Calculate age
    age = calc_age(birthyear_int)
    age_str = str(age)

    # Print out message
    message = introduce_message(name, age_str)
    print(message)

def ask_name():
    name = input("What's your name? ")
    return name

def ask_birthyear():
    birthyear = input("What's your birth year? ")
    return birthyear

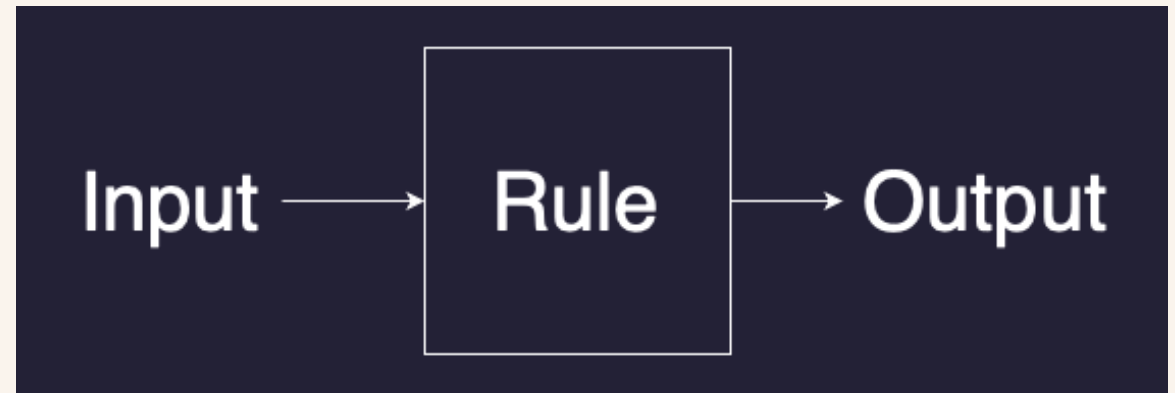
def calc_age(birthyear):
    age = 2023 - birthyear
    return age

def introduce_message(name, age):
    return "My name is " + name + " and I am " + age + " years old."

main()
```

Control

- **conditionals:** branching
- loops: repetition



Should I go to class today?

+-- Did I do the homework?

+-- Yes:

+-- Is there free food on campus today?

+-- Yes: Go to class (and grab food)

+-- No:

+-- Have I already skipped too many times?

+-- Yes: Go to class (sigh)

+-- No: Play video games at home

+-- No:

+-- Will the professor notice if I'm not there?

+-- Yes: Go to class (and pretend to understand)

+-- No:

+-- Is my favorite show releasing a new episode today?

+-- Yes: Stay home and watch

+-- No: Go to class (while feeling guilty)

1. Is x less than y?

```
Enter a number: 5  
Enter another number: 3  
x is greater than y
```

```
Enter a number: 2  
Enter another number: 2  
x is equal to y
```

```
Enter a number: 1  
Enter another number: 4  
x is less than y
```


Comparison operators

>

<

>=

<=

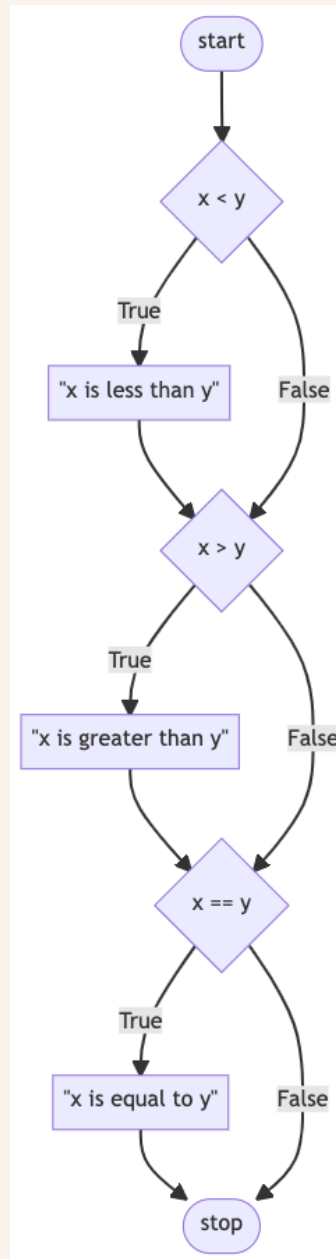
==

!=

if to create branches

```
x = int(input("Enter a number: "))
y = int(input("Enter another number: "))

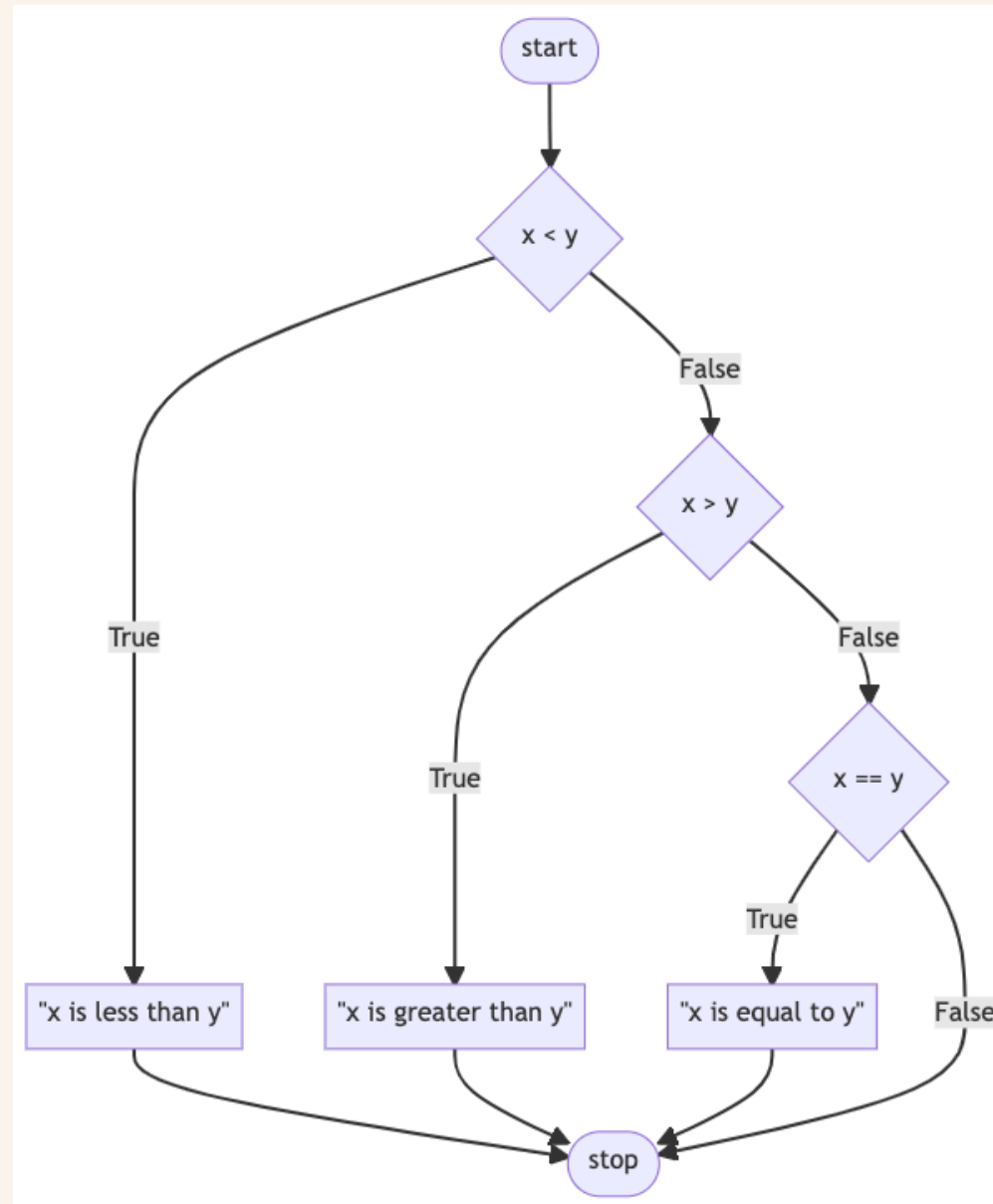
if x < y:
    print("x is less than y")
if x > y:
    print("x is greater than y")
if x == y:
    print("x is equal to y")
```



elif (else if)

```
x = int(input("Enter a number: "))
y = int(input("Enter another number: "))

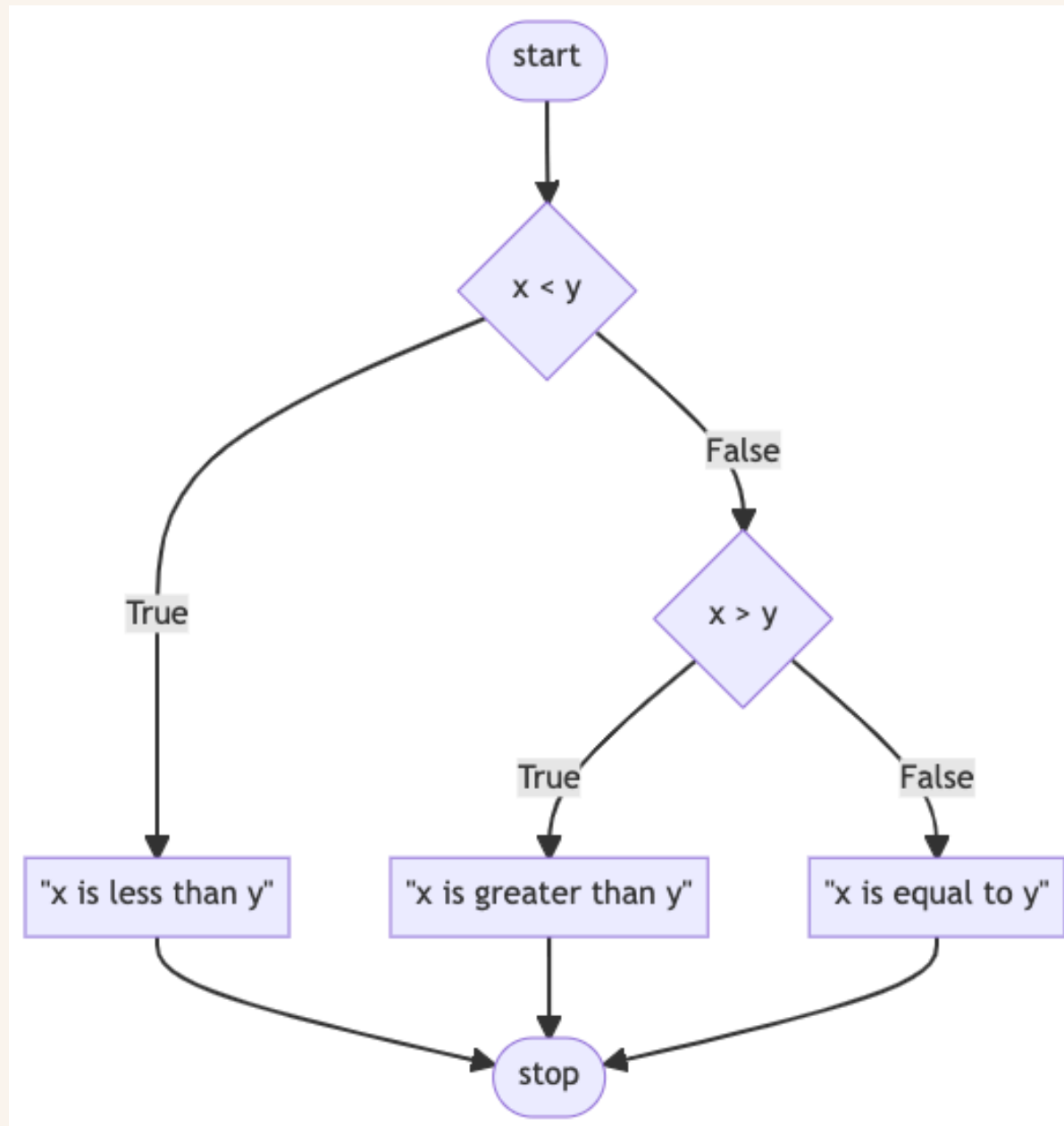
if x < y:
    print("x is less than y")
elif x > y:
    print("x is greater than y")
elif x == y:
    print("x is equal to y")
```



else

```
x = int(input("Enter a number: "))
y = int(input("Enter another number: "))

if x < y:
    print("x is less than y")
elif x > y:
    print("x is greater than y")
else:
    print("x is equal to y")
```



nested **if** statements

```
x = int(input("Enter a positive number: "))
y = int(input("Enter another number: "))

if x > 0:
    if x < y:
        print("x is less than y")
    elif x > y:
        print("x is greater than y")
    else:
        print("x is equal to y")
else:
    print("x is not positive")
```




2. find the smallest number

Requirements:

- Prompt the user to enter three numbers, convert them to integers, and store them in variables named x, y, and z.
- Use **nested if** statements to find the smallest number among the three.
- Print out which variable holds the smallest value with a message like "x is the smallest."

Expected Outputs:

```
Enter a number (x): 5
Enter another number (y): 3
Enter another number (z): 7
y is the smallest
```

3. Is x equal to y?

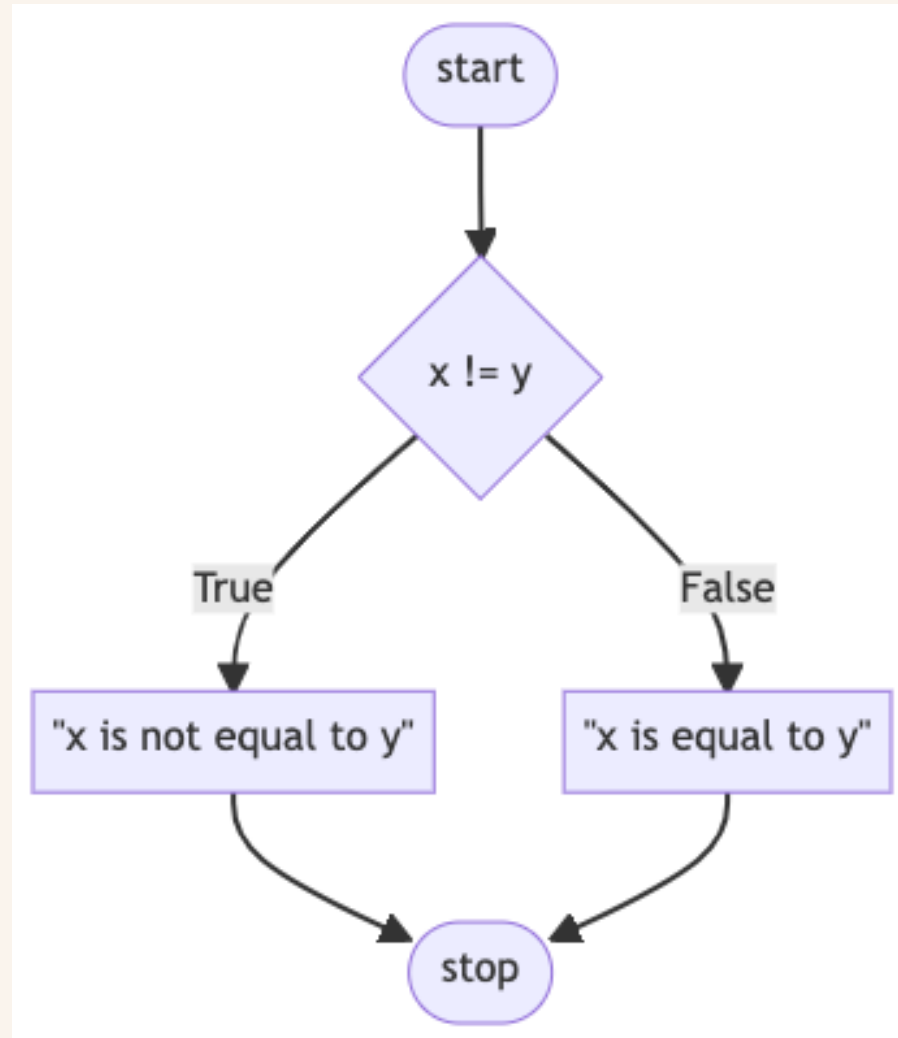
```
Enter a number: 5  
Enter another number: 3  
x is not equal to y
```

```
Enter a number: 7  
Enter another number: 7  
x is equal to y
```

!= (not equal to)

```
x = int(input("Enter a number: "))
y = int(input("Enter another number: "))

if x != y:
    print("x is not equal to y")
else:
    print("x is equal to y")
```



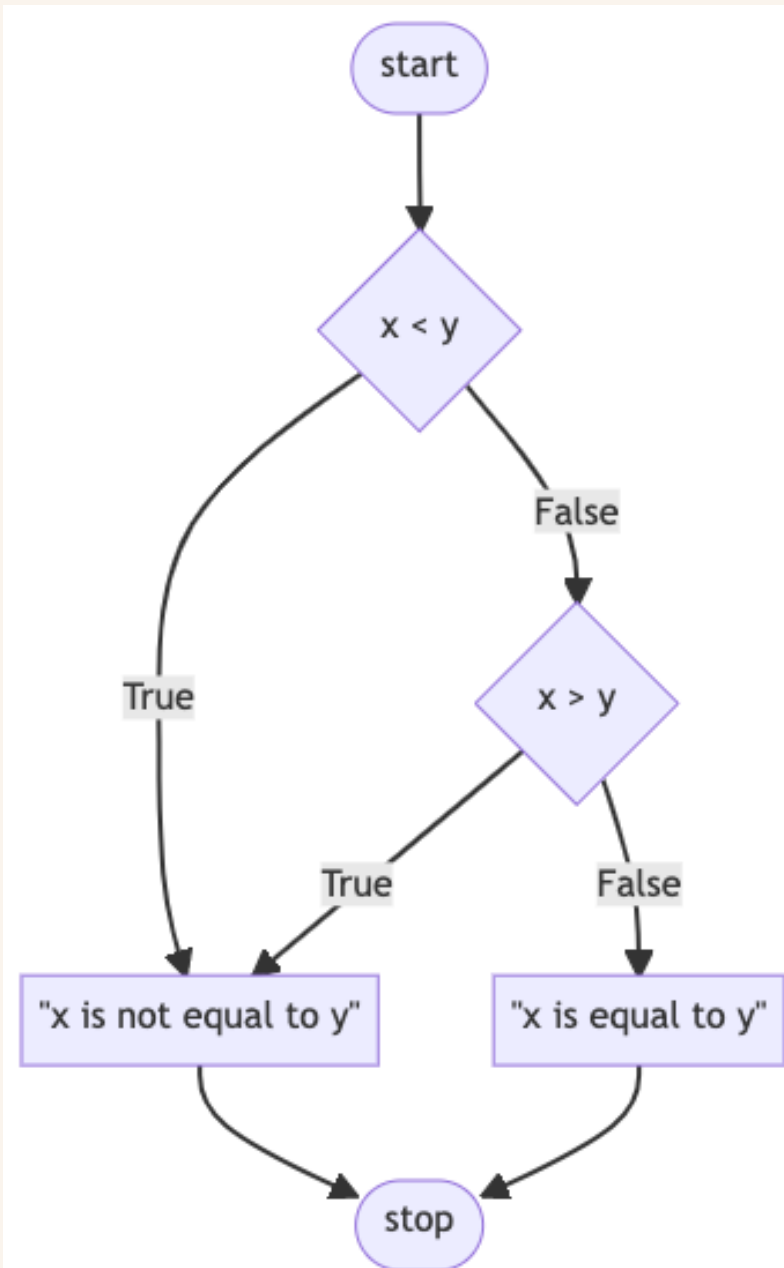
Logical operators to combine conditions

- `or` : either A or B is true
- `and` : both A and B are true
- `not` : negates the truth value

or

```
x = int(input("Enter a number: "))
y = int(input("Enter another number: "))

if x < y or x > y:
    print("x is not equal to y")
else:
    print("x is equal to y")
```



not

```
x = int(input("Enter a number: "))
y = int(input("Enter another number: "))

if not x == y:
    print("x is not equal to y")
else:
    print("x is equal to y")
```


4. Gradebook

Enter your score: 87
A

Enter your score: 72
B

Enter your score: 60
C

and

```
score = int(input("Enter your score: "))

if score >= 85 and score <= 100:
    print("A")
elif score >= 80 and score < 85:
    print("A-")
elif score >= 75 and score < 80:
    print("B+")
elif score >= 70 and score < 75:
    print("B")
elif score >= 65 and score < 70:
    print("B-")
else:
    print("C")
```

Compound inequality

```
score = int(input("Enter your score: "))

if 85 <= score <= 100:
    print("A")
elif 80 <= score < 85:
    print("A-")
elif 75 <= score < 80:
    print("B+")
elif 70 <= score < 75:
    print("B")
elif 65 <= score < 70:
    print("B-")
else:
    print("C")
```

```
score = int(input("Enter your score: "))

if score >= 85:
    print("A")
elif score >= 80:
    print("A-")
elif score >= 75:
    print("B+")
elif score >= 70:
    print("B")
elif score >= 65:
    print("B-")
else:
    print("C")
```

What am I not A? 🤔

```
score = int(input("Enter your score: "))

if score >= 85:
    print("A")
if score >= 80:
    print("A-")
if score >= 75:
    print("B+")
if score >= 70:
    print("B")
if score >= 65:
    print("B-")
```



5. Find the largest number

Requirements:

- Prompt the user to enter three numbers, convert them to integers, and store them in variables named x, y, and z.
- Use if and elif statements to find the largest number among the three. [**Hint:** You can use the `and` operator to combine conditions]
- Print out a message identifying the variable that holds the largest value, e.g., "x is the largest."

Expected Outputs:

```
Enter a number (x): 5
Enter another number (y): 3
Enter another number (z): 7
z is the largest
```

6. Parity

```
Enter a number: 4  
x is even
```

```
Enter a number: 7  
x is odd
```

Modulo %

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


`is_even()`: what does it return?

```
def main():  
    x = int(input("Enter a number: "))  
  
    x_is_even = is_even(x)  
  
    if x_is_even:  
        print("x is even")  
    else:  
        print("x is odd")  
  
def is_even(x):  
    ...  
  
main()
```

Conditional return True or False

```
print(2 > 1) # True

print(5 % 2 == 0) # False

if x % 2 == 0: # True or False
    print("x is even")

if x > y: # True or False
    print("x is greater than y")

if score >= 85: # True or False
    print("A")

if True:
    print("always get printed")

if False:
    print("never get printed")
```

A or B? 🤔

```
if 2 > 1:  
    print("A")  
  
else:  
    print("B")
```

A or B? 🤔

```
if True:    # 2 > 1
    print("A")

else:
    print("B")
```

A or B? 🤔

```
if 2 == 1:  
    print("A")  
  
else:  
    print("B")
```

A or B? 🤔

```
if False:    # 2 == 1
    print("A")

else:
    print("B")
```

A or B? 🤔

```
if 2 > 1 or 2 == 1:  
    print("A")  
  
else:  
    print("B")
```

A or B? 🤔

```
if True or False:    # 2 > 1 or 2 == 1
    print("A")

else:
    print("B")
```


bool: True or False

```
def is_even(x):  
    if x % 2 == 0:  
        return True # bool  
    else:  
        return False # bool  
  
x = 10  
x_is_even = is_even(x)  
  
print(x_is_even)  
print(type(x_is_even))
```

```
def main():  
    x = int(input("Enter a number: "))  
  
    x_is_even = is_even(x)  
  
    if x_is_even:    # True or False from is_even()  
        print("x is even")  
    else:  
        print("x is odd")  
  
def is_even(x):  
    if x % 2 == 0:  
        return True  
    else:  
        return False  
  
main()
```

Ternary operator

```
def is_even(x):  
    return True if x % 2 == 0 else False
```

Condition itself is **boolean** expression

```
def is_even(x):  
    return x % 2 == 0
```

```
def main():  
    x = int(input("Enter a number: "))  
    y = int(input("Enter another number: "))  
  
    if is_even(x): # x_is_even  
        print("x is even")  
    else:  
        print("x is odd")  
  
def is_even(x):  
    return x % 2 == 0 # True or False  
  
main()
```

7. Is it odd?

Requirements:

- Write the function `is_odd(x)` to determine if the number is odd or even.
- The function should return True if the number is odd and False otherwise.
- Use an if statement to check the output from `is_odd(x)`.
 - If True, double the number.
 - If False, square the number.

Expected Outputs:

```
Enter a number: 3
x is odd. 3+3 = 6
```

```
Enter a number: 4
x is even. 4*4 = 16
```

8. Department matcher

Enter a course code: INSY
Management

Enter a course code: MATH
Mathematics

Enter a course code: XYZ
I don't know

String comparison

```
code = input("Enter a course code: ")

if code == "INSY":
    print("Management")
elif code == "ACCT":
    print("Management")
elif code == "FINE":
    print("Management")
elif code == "AEMA":
    print("Agriculture & Environmental Sciences")
elif code == "ECON":
    print("Economics")
elif code == "MATH":
    print("Mathematics")
else:
    print("I don't know")
```


String comparison

```
code = input("Enter a course code: ")

if code == "INSY" or code == "ACCT" or code == "FINE":
    print("Management")
elif code == "AEMA":
    print("Agriculture & Environmental Sciences")
elif code == "ECON":
    print("Economics")
elif code == "MATH":
    print("Mathematics")
else:
    print("I don't know")
```

Clean up user input

```
def clean(s):  
    return s.strip().upper()  
  
code = clean(input("Enter a course code: "))  
  
if code == "INSY" or code == "ACCT" or code == "FINE":  
    print("Management")  
elif code == "AEMA":  
    print("Agriculture & Environmental Sciences")  
elif code == "ECON":  
    print("Economics")  
elif code == "MATH":  
    print("Mathematics")  
else:  
    print("I don't know")
```

Break out of conditionals in functions

```
def main():
    code = clean(input("Enter a course code: "))
    print(get_department(code))

def clean(s):
    return s.strip().upper()

def get_department(code):
    if code == "INSY" or code == "ACCT" or code == "FINE":
        return "Management"
    elif code == "AEMA":
        return "Agriculture & Environmental Sciences"
    elif code == "ECON":
        return "Economics"
    elif code == "MATH":
        return "Mathematics"
    else:
        return "I don't know"

main()
```

Will this work? 🤔

```
def main():
    code = clean(input("Enter a course code: "))
    print(get_department(code))

def clean(s):
    return s.strip().upper()

def get_department(code):
    if code == "INSY" or code == "ACCT" or code == "FINE":
        return "Management"
    if code == "AEMA":
        return "Agriculture & Environmental Sciences"
    if code == "ECON":
        return "Economics"
    if code == "MATH":
        return "Mathematics"

main()
```

Takehome exercise 2 & Assignment 1

- **Exercise 2:** Intermediate Python
- **Assignment 1**
- Both due in two weeks before Quiz 1