

# Control

## Recap

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



## 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()
```



## Recap: 8. Personalized Introduction 3

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

    # Calculate age
    age = calc_age(birthyear)

    # Print out message
    print(introduce_message(name, age))

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

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

def calc_age(birthyear):
    return 2023 - int(birthyear)

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

>

<

>=

<=

==

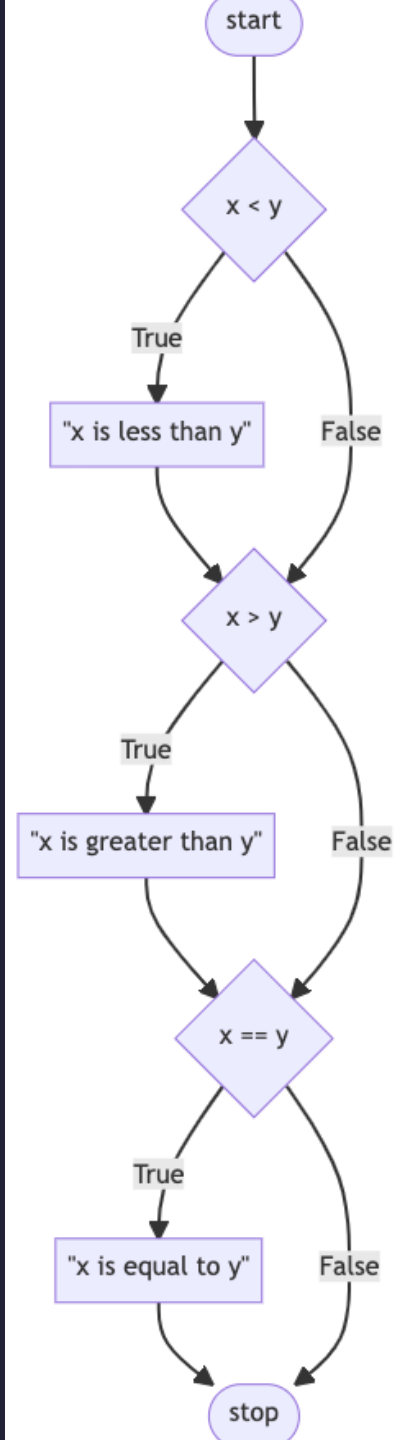
!=



# if

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

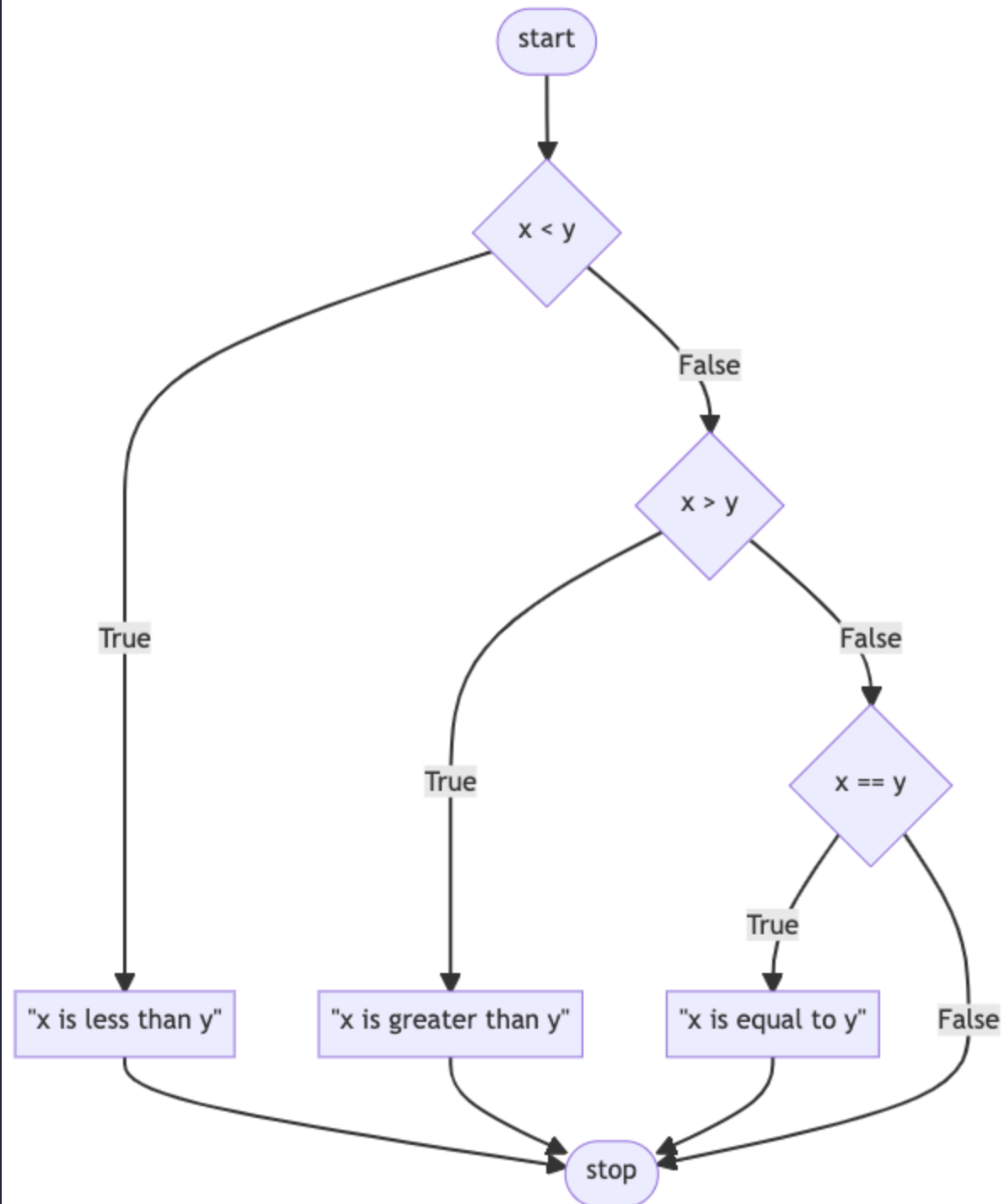
if x < y:
    print("x is less than y")
if x > y:
    print("x is greater than y")
if x == y:
    print("x is equal to y")
```



## elif (else if)

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

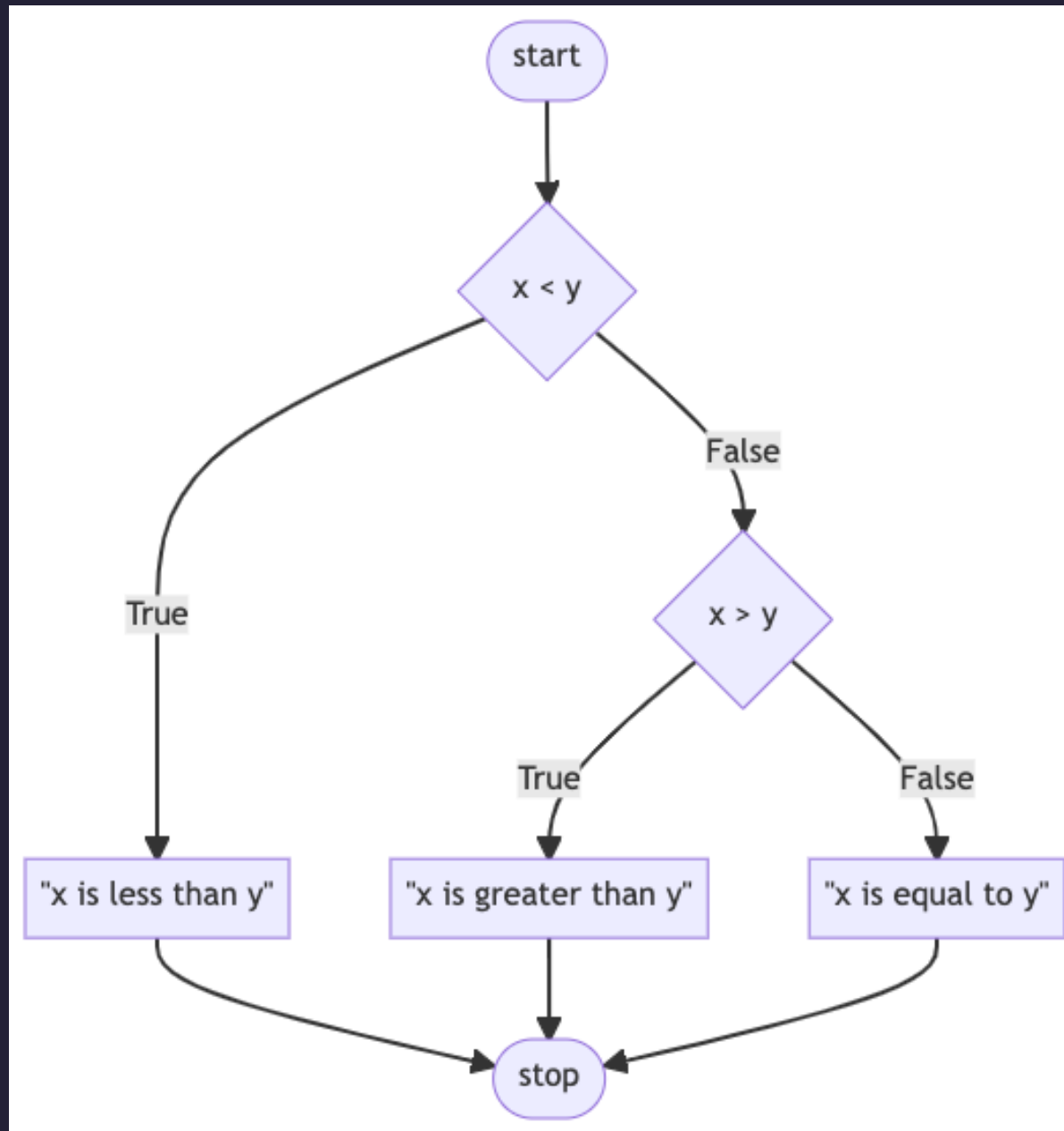
if x < y:
    print("x is less than y")
elif x > y:
    print("x is greater than y")
elif x == y:
    print("x is equal to y")
```



## 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
```





## 2. find the smallest number (solution)

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

if x < y:
    if x < z:
        print("x is the smallest")
    else:
        print("z is the smallest")
else:
    if y < z:
        print("y is the smallest")
    else:
        print("z is the smallest")
```

### 3. Is x equal to y?

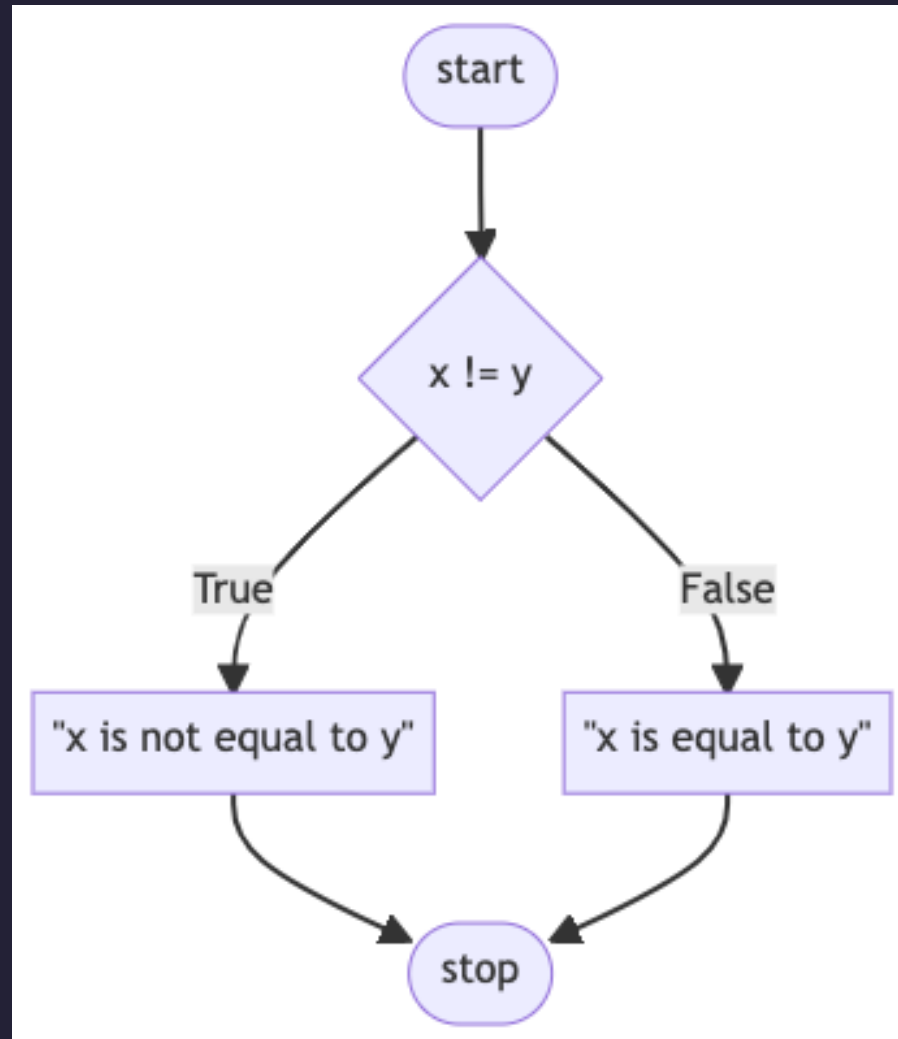
```
Enter a number: 5  
Enter another number: 3  
x is not equal to y
```

```
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")
```



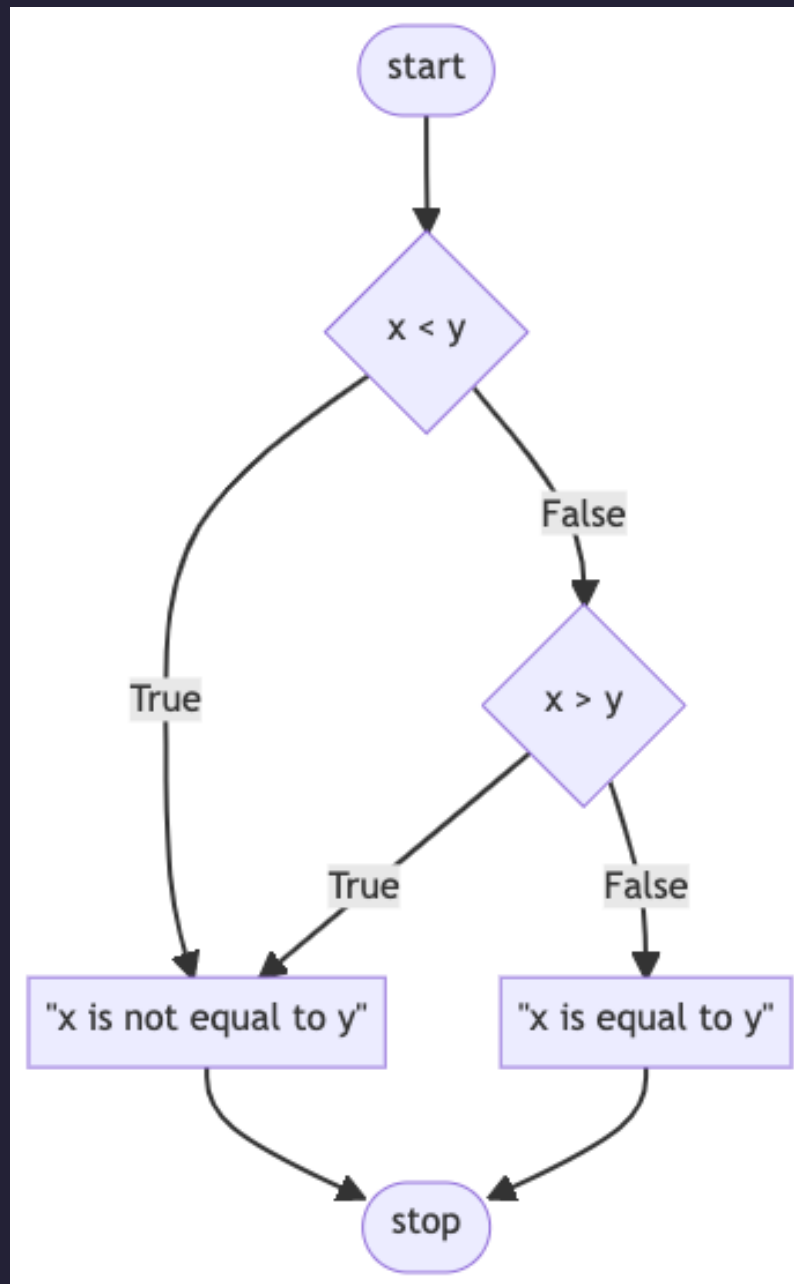
# Logical operators

- or
- and
- not

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
```



## 5. Find the largest number (solution)

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

if x > y and x > z:
    print("x is the largest")
elif y > x and y > z:
    print("y is the largest")
else:
    print("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")
```

## Start with `main()`

```
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
```



## 7. Is it odd? (solution)

```
def main():
    x = int(input("Enter a number: "))

    if is_odd(x):
        print(f"x is odd. {x}+{x} = {x+x}")
    else:
        print(f"x is even. {x}*{x} = {x*x}")

def is_odd(x):
    return x % 2 != 0
    # return not x % 2 == 0

main()
```



## 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

- Course Logistics>Course Tools>DataCamp Signup
- **Use your mcgill email address**
- Intermediate Python: Chapter 2,3,4
- Due next week before the class