Lecture 10
Week 5

len()

- len() is a standard python function (no import needed)
- Returns the number of elements in an object
- In a string it returns the number of characters

Get a single character

word = "Fred"
word[0] → "F"
word[1] → "r"
etc.

Boolean operators

Boolean operators relate two Boolean expressions i.e. we combine criteria

- "I will buy the coat if they have it in my size AND it is less than €50"
- "I will eat cheesecake if it is Lemon OR Toblerone"
- "I will eat cheesecake if it is NOT Strawberry"
- "I will eat chips with salt OR vinegar but not salt AND vinegar"

I will buy a coat if they have it in my size and it costs less than €50

```
1   # Author: Alison
2   #=Purpose: examples of boolean conditions
3
4   # I will buy a coat if they have it in my side and it is less than €50
5   size = input("Size of coat: ")
6   cost = int(input("Cost of coat: "))
7
8   if size == "medium" and cost <= 50:
9       print("Buy the coat!")
```

I will eat cheesecake if it is Lemon or Toblerone

```
11
12  # I will eat cheesecake if it is lemon or toblerone
13  flavour = input("What flavour cheesecake is this: ")
14
15  if flavour == "lemon" or flavour == "toblerone":
16      print("Eat the cheesecake")
```

I will eat cheesecake if it is NOT Strawberry

```
19  # I will eat cheesecake if it is not strawberry
20  flavour = input("What flavour cheesecake is this: ")
21
22  if not flavour == "strawberry":
23      print("Eat the cheesecake")
```

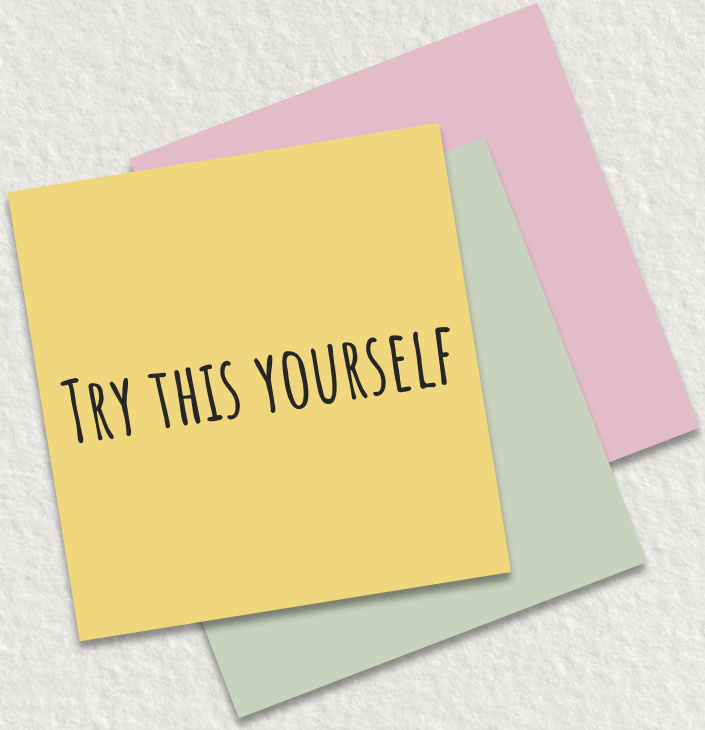
`size == "medium" and cost <= 50`	and : both expressions must be true for the overall expression to be true.
`flavour == "toblerone" or flavour == "lemon"`	or : one or both expressions must be true for the overall expression to be true. It is only necessary for one to be true, and it does not matter which one.

`not flavour == "strawberry"`
 	
`flavour != "strawberry"`
	The not operator operates on one Boolean expression – a unary operator.
	The not operator reverses the truth of its operand.
	• If it is applied to an expression that is true, the operator returns false.
	• If it is applied to an expression that is false, the operator returns true.

Loan Qualification

A customer will qualify for a loan if their annual salary is at least €30,000 and they have been in their job for at least 3 years.

Write a program to determine if they qualify



Truth tables come from logical mathematics

The and operator takes two Boolean expressions and the result is only true if both expressions are true.

AND

A	B	A AND B
FALSE	FALSE	FALSE
FALSE	TRUE	FALSE
TRUE	FALSE	FALSE
TRUE	TRUE	TRUE

Or

Truth tables come from logical mathematics

The or operator takes two Boolean expressions and the result is true if either of the expressions is true.

A	B	A OR B
False	False	False
False	True	True
True	False	True
True	True	True

New variable type

Boolean variables

- A Boolean variable can be either True or False
- Commonly used as flags

```
number = int(input("What is the number?"))

is_even = number % 2 == 0
is_positive = number > 0

if is_positive and is_even:
    print("This number is acceptable - programming proceeding....")
    print("Program would now go on to do more stuff....")
else:
    print("This number is unacceptable - terminating....")
```

Truth tables come from logical mathematics

The not operator makes a True value False and it makes a False value True.

NOT

A	Not A
False	True
True	False

Order of preced

- Not
- And
- Or

Since most people don't memorize the Boolean precedence rules, so use brackets to prevent confusion

r not b and c

(a or ((not b) and c))

Number ranges

Ranges

Provide comments to students based on their exam grades

- 70 – 100 is "Outstanding“
- 40 t o 69 is "Competent“
- 0-39 is "Fail"

```
mark = int(input("What mark did you get? "))

if 0 <= mark <= 39:
    print("Fail")
elif 40 <= mark <= 69:
    print("Competent")
elif 70 <= mark <= 100:
    print("Outstanding")
else:
    print("Invalid mark entered")
```

Find the largest of three numbers

- Read three number a, b, and c
- If a is bigger than b and a is bigger than c it is the largest
- If b is bigger than a and b is bigger than c it is the largest
- If c if bigger than a and c is bigger than b it is the largest

```
a = int(input("Number ==> "))
b = int(input("Number ==> "))
c = int(input("Number ==> "))

if a > b and a > c:
    print(f"{a} is the biggest number")
elif b > a and b > c:
    print(f"{b} is the biggest number")
elif c > a and c > b:
    print(f"{c} is the biggest number")
```

Find the largest of three numbers

- Read three number a, b, and c
- If a is bigger than b and a is bigger than c it is the largest
- If b is bigger than a and b is bigger than c it is the largest
- If c if bigger than a and c is bigger than b it is the largest

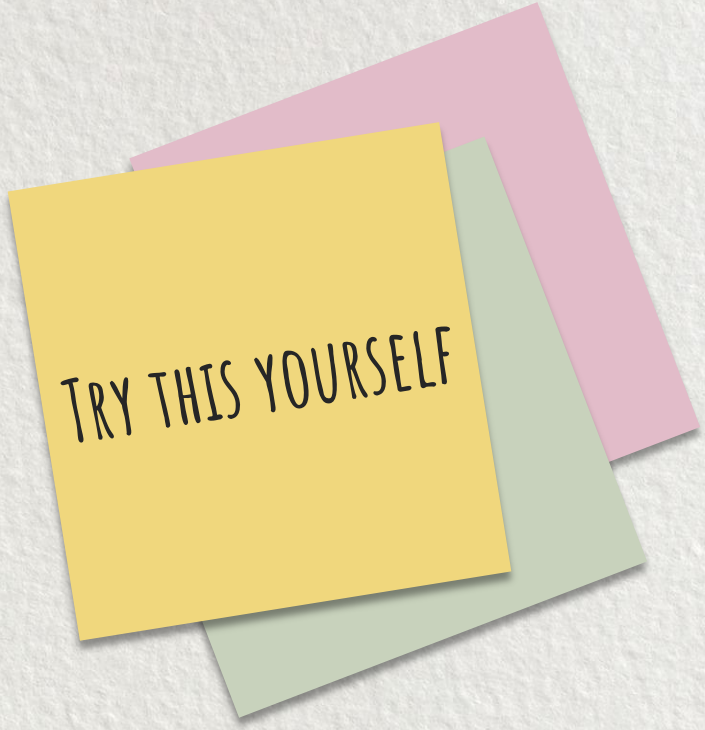
```
a = int(input("Number ==> "))
b = int(input("Number ==> "))
c = int(input("Number ==> "))

if b < a > c:
    print(f"{a} is the biggest number")
elif a < b > c:
    print(f"{b} is the biggest number")
elif a < c > b:
    print(f"{c} is the biggest number")
```

Find the largest of three numbers

- Read three number a, b, and c
- If a is bigger than b and a is bigger than c it is the largest
- If b is bigger than a and b is bigger than c it is the largest
- If c if bigger than a and c is bigger than b it is the largest

```
if a == b and b == c:
    print("All 3 numbers are the same")
elif b <= a >= c:
    print(f"{a} is the biggest number")
elif a <= b >= c:
    print(f"{b} is the biggest number")
elif a <= c >= b:
    print(f"{c} is the biggest number")
```



Shipping charges

The Fast Freight Shipping Company charges the following rates:

Weight of Package	Rate per kg
2 kgs or less	€1.50
Over 2 kgs but not more than 6 kgs	€3.00
Over 6 kgs	€4.00

Asks the user to enter the weight of a package then display the shipping charges.