CMPUT 174

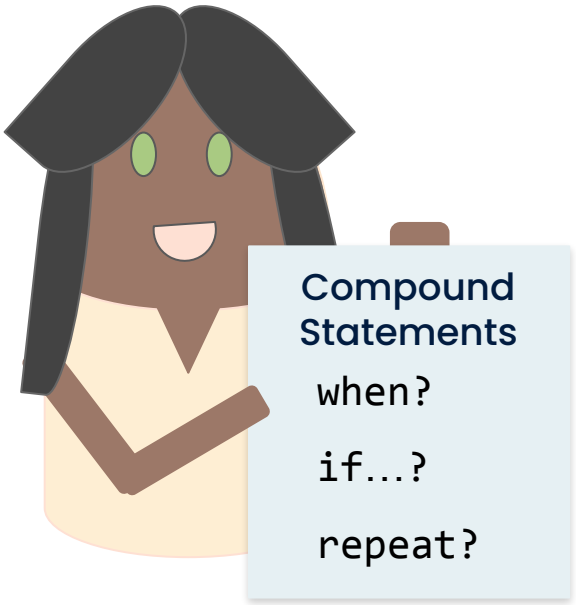
Conditional Statements

Lecture Outline

- ❑ Compound Statements
- ❑ Conditional Expressions
- ❑ Conditional Statements
- ❑ Nested Conditional Statements

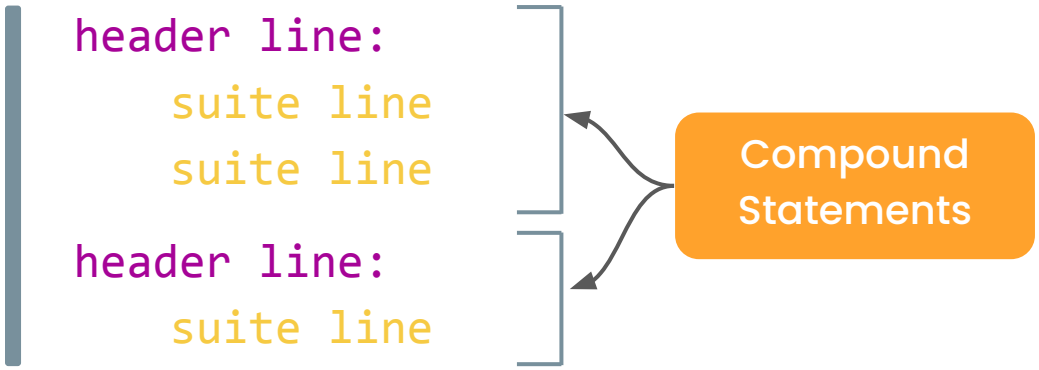
What are Compound Statements?

- Compound Statements are made up of other statements, including Simple Statements and more Compound Statements
- They are often used to control *when, if, and how many times* certain lines of code should be evaluated



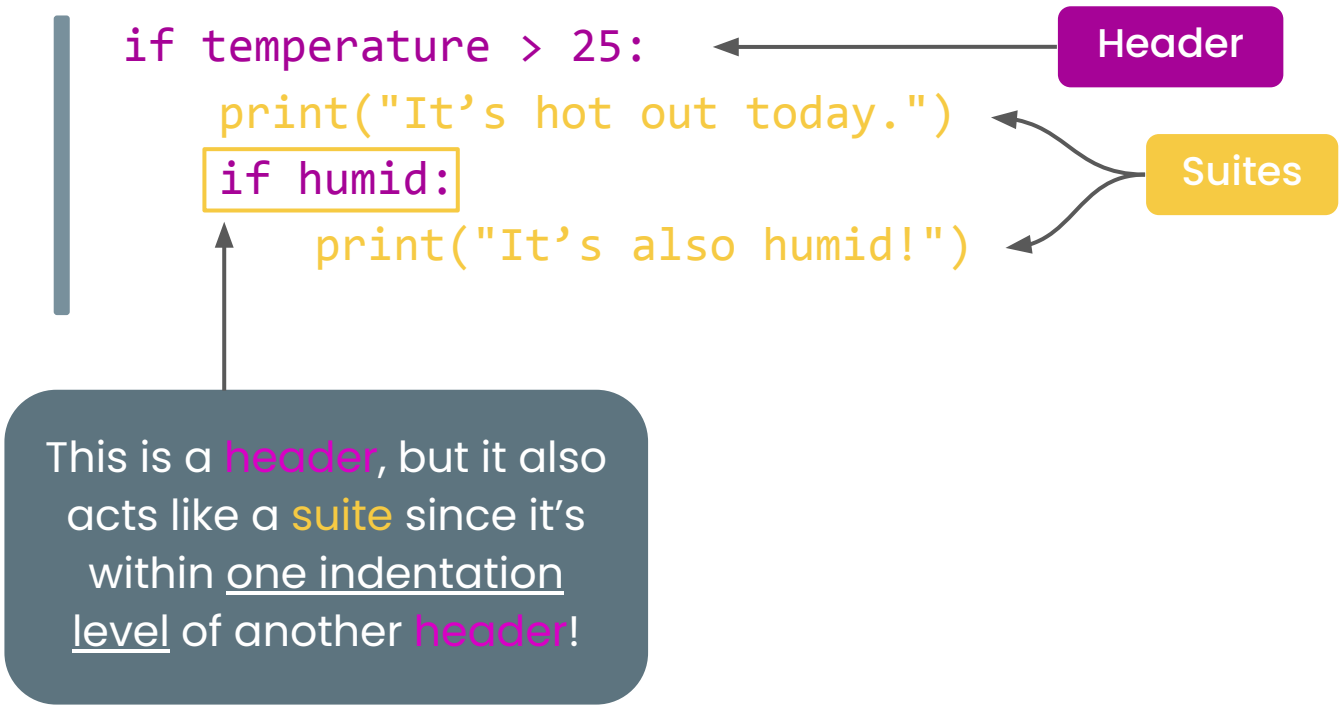
What are Compound Statements?

- Compound statements are composed of 'clauses', which are divided into a header and a 'suite'
- The first line is called the header. The following lines, indented one level from the header, are called the suite



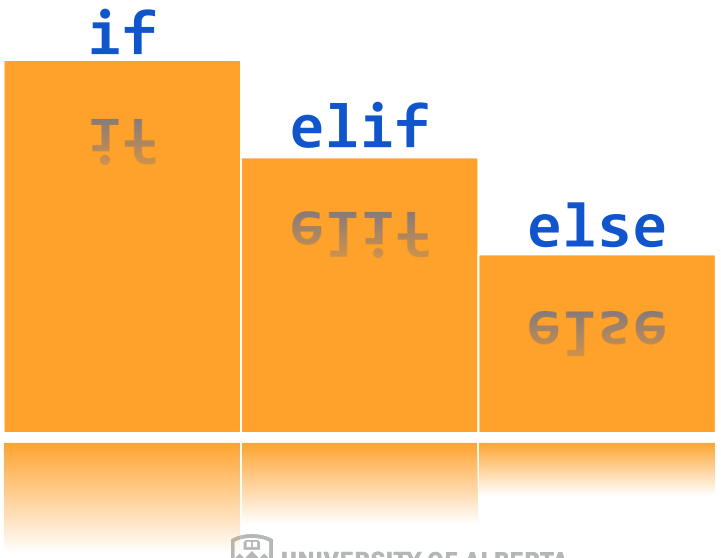
What are Compound Statements?

- As an illustration, an if statement, a kind of compound statement, might look like this:



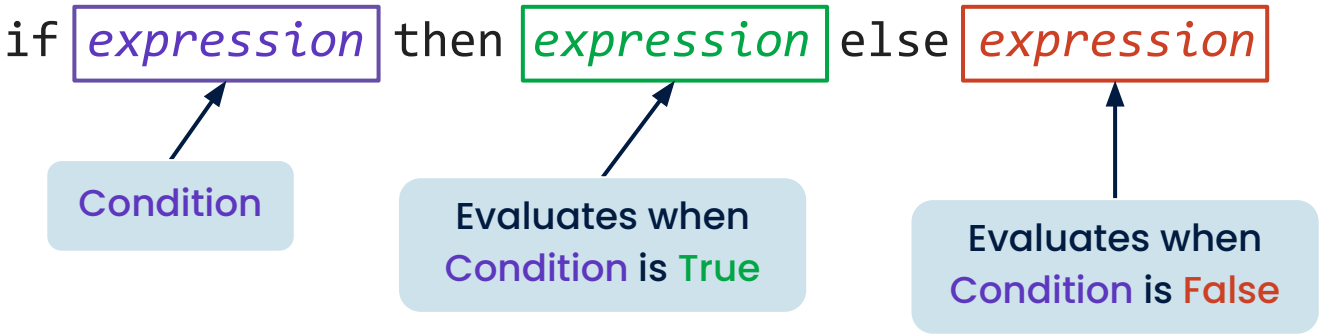
Conditional Statements

- Conditional Expressions
- *if*, *elif*, *else*
- Order Matters
- Nested Conditional Statements



Conditional Expressions

- Conditional expressions are part of a complete program statement, like compound statements, that ask a *True* or *False* question about a property, variable, or other piece of data



Conditional Expressions

```
>>> x = 4
>>> y = 5
>>> z = 9
```

Based on the following assignment statements

You can evaluate many different conditional expressions!

```
>>> x > y
False
```

```
>>> x + y >= z
True
```

```
>>> x + y == z
True
```

```
>>> y < z
True
```

```
>>> y <= x + z
True
```

```
>>> z > y and z > x
True
```

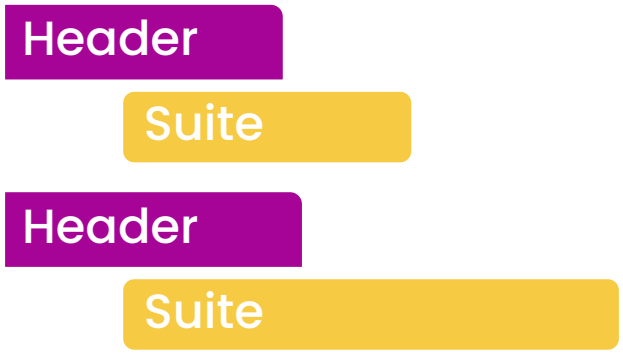
```
>>> x != y
True
```

```
>>> z > y or z < x
True
```

```
>>> z > y and z < x
False
```

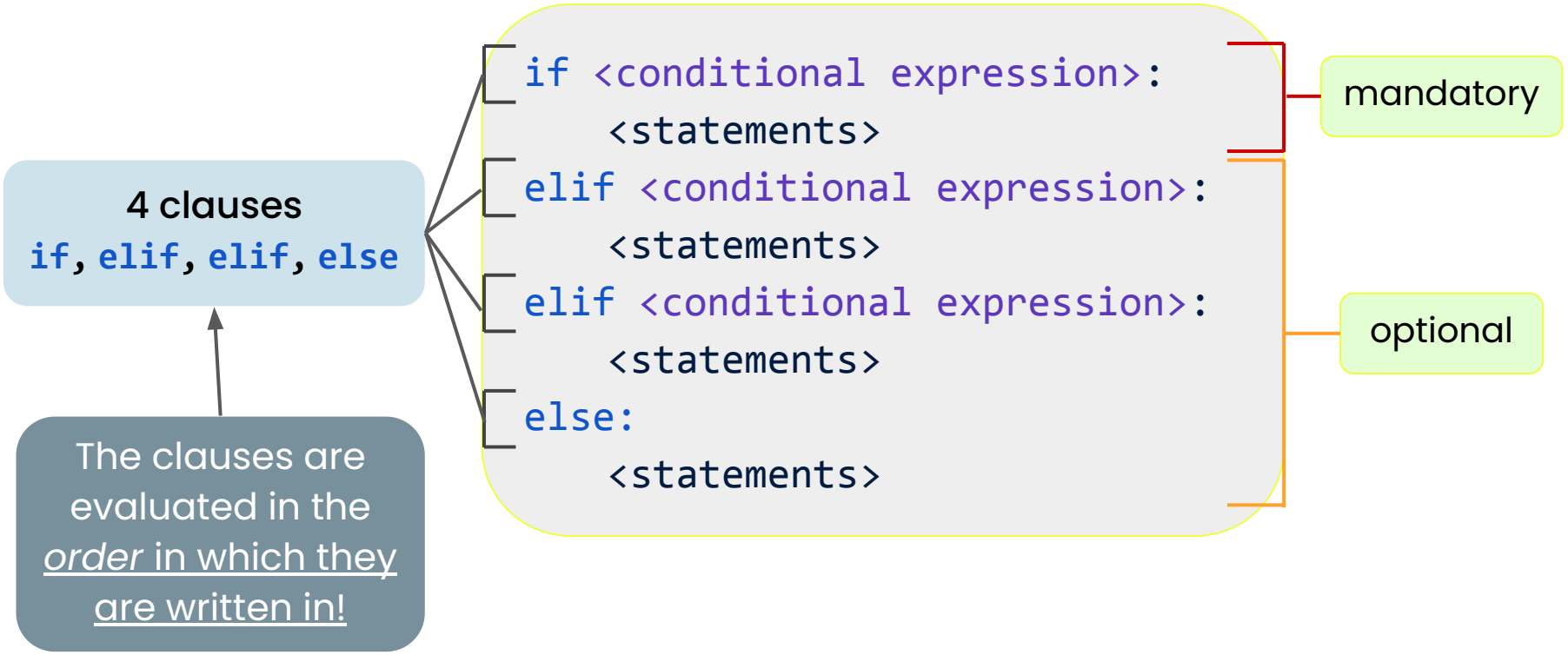
Conditional Statements (*if*, *elif*, *else*)

- Conditional statements are the first kind of compound statements we will see in Python
- They allow the program to make decisions based on a given expression
- Conditional statements are made out of *3* clauses – `if`, `elif`, and `else`
- Each clause is made of a header and a suite



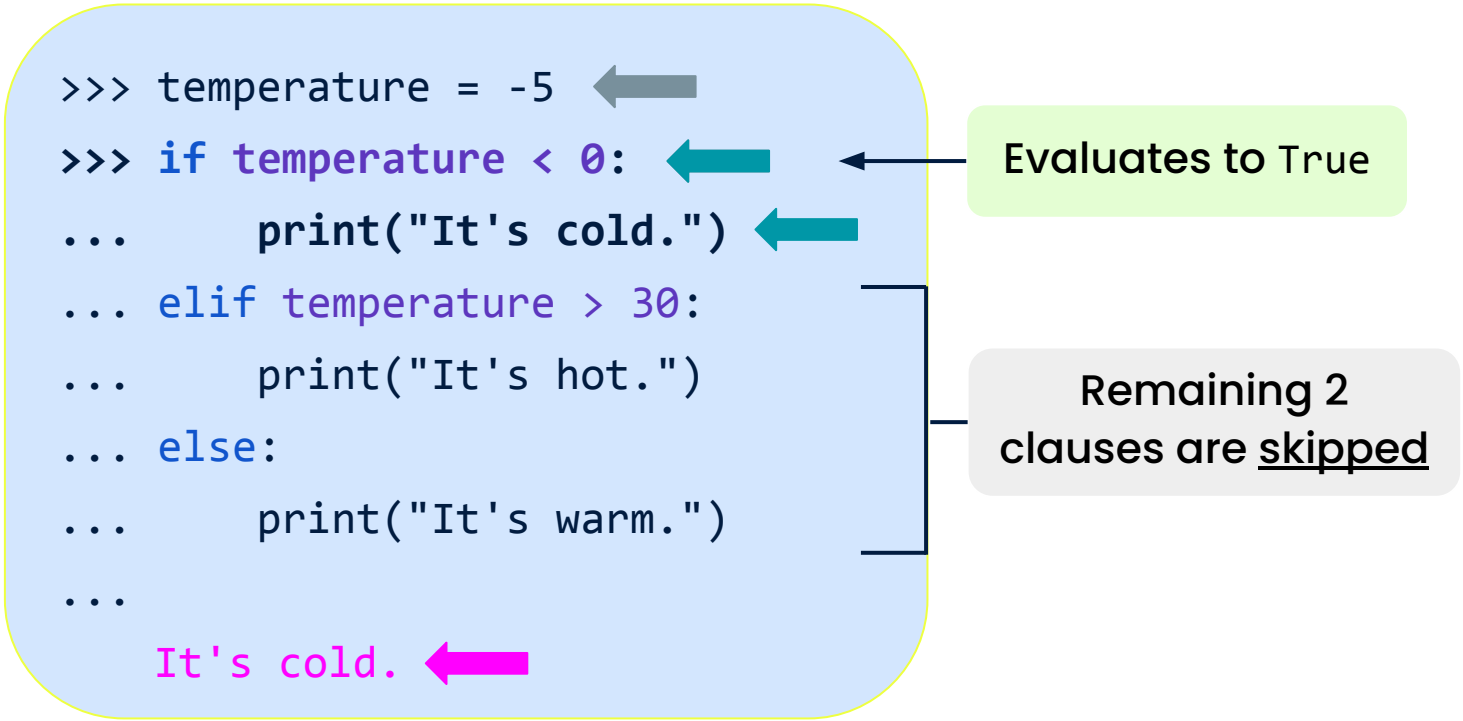
Conditional Statements (*if*, *elif*, *else*)

- Generally, `if` statements have the following format:



if Clauses

- `if` clauses are mandatory
- The suite of an `if` clause is evaluated only if the expression in its header evaluates to `True`



elif Clauses

- The suite of an `elif` (short for else if) clause is evaluated only if the expression in its header evaluates to `True`
- *And* only if the expressions of the preceding `if` and `elif` headers have evaluated to `False`

```
>>> temperature = 32
>>> if temperature < 0:
...     print("It's cold.")
... elif temperature > 30:
...     print("It's hot.")
... else:
...     print("It's warm.")
...
It's hot.
```

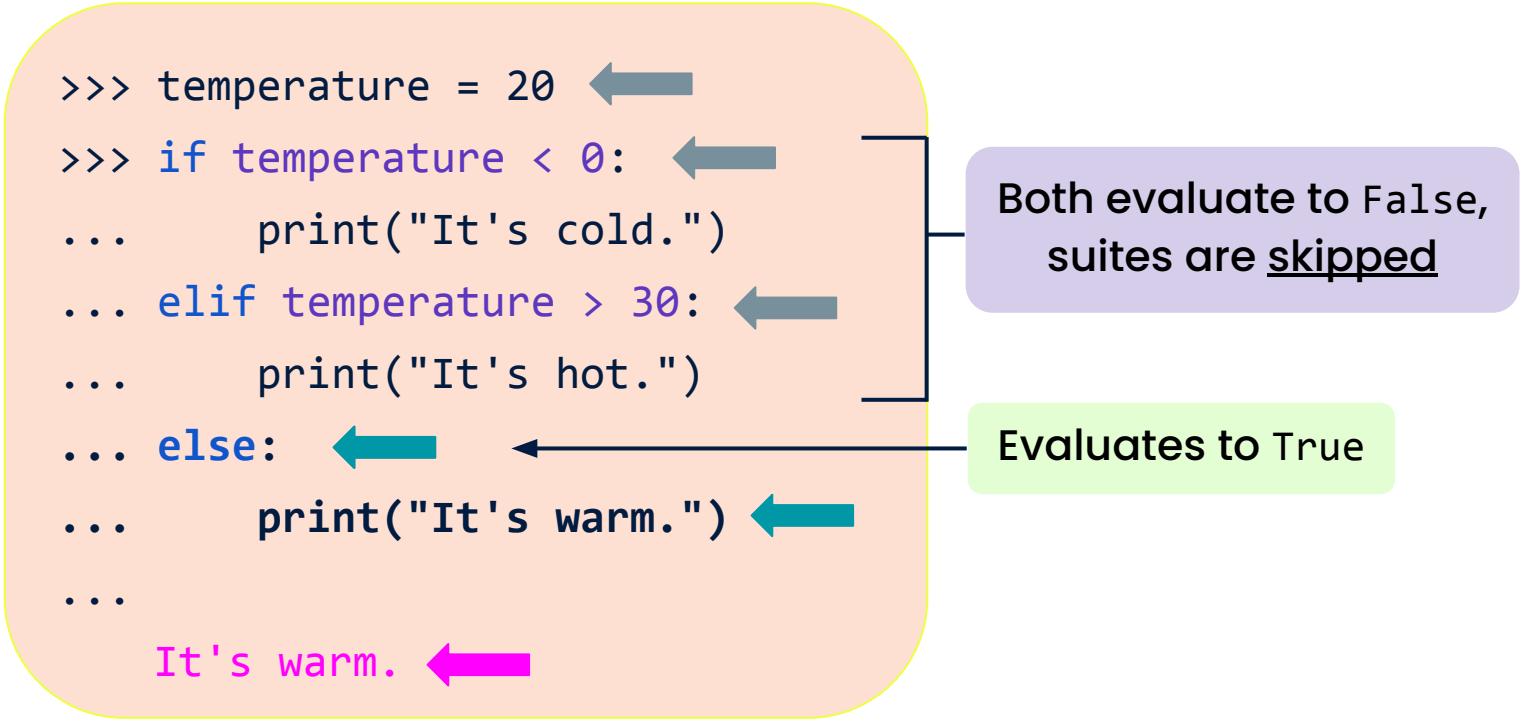
Expression in the header of the if clause evaluates to `False`,

Evaluates to `True`

Clause is skipped

else Clauses

- The suite of an `else` clause is evaluated only if all preceding expressions of the `if` and `elif` headers have evaluated to `False`



Order Matters!!

- The order of the **clauses** is *important* if their conditions are not mutually exclusive – two or more events that occur simultaneously

```
>>> temperature = 35
>>> if temperature > 15:
...     print("It's warm today.")
... elif temperature > 30:
...     print("It's hot today.")
... elif temperature > 40:
...     print("It's very hot today.")
...
    It's warm today.
```

The wrong conditional expression gets satisfied, executing the wrong suite! :(

Nested Conditional Statements

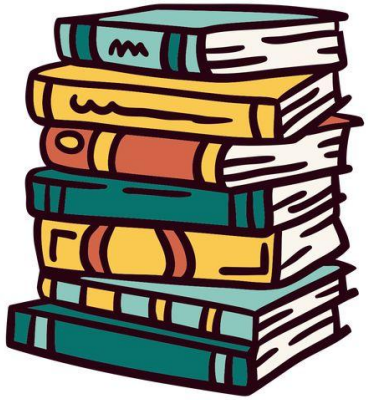
- We can also have nested conditional statements
- The suite of a conditional statement can include conditional statements

```
>>> temperature = 15
>>> rainy = True
>>> if temperature > 0:
...     if rainy == True:
...         print("Bring an umbrella.")
... else:
...     print("It's cold.")
...
Bring an umbrella.
```

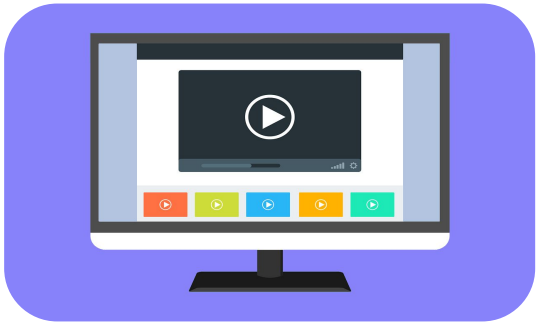
A conditional statement inside a different conditional statement

Reminder

- *Online Activities*:
  - Assigned Readings:
    - Compound Statements



  - Week 3 Videos(2):
    - Conditional Statements
    - Order of evaluating logical statements



Mr. Ratburn's Classroom

Image Source: https://giphy.com/gifs/pbskids-arthur-back-to-school-pbs-kids-kbcLWrW6QPll7SKwgc

Practice Problem 1!

if statement with if clause only

'''Mr. Ratburn is a teacher at an elementary school. Unfortunately, the school heating system is not working properly.

As per school policy, if the outside temperature falls **below -5 degrees Celsius**, Mr. Ratburn needs to make sure that students are wearing their jackets before they enter the classroom.

Practice Problem 1!

Write a program that asks Mr. Ratburn for the temperature in Celsius and then determines and prints if he needs to ask students to wear a jacket.

```
...
```

Practice Problem 2!

if statement with if and else clause

```
'''Mr. Ratburn wants to assign seating in his
classroom based on the first letter of students'
names.

Students whose names start with letters A - M are
on the left side of the classroom.

Students whose names start with letters N - Z are
on the right side of the classroom.

You can help Mr. Ratburn assign a side to a
student. Write a program that asks for a name and
then determines and prints which side of the
classroom the student will be seated.
'''
```

Practice Problem 3!

if statement with if, elif, and else clause

'''Mr. Ratburn wants to encourage his students to do better in class, and he decides that the best way to do this is through food.

After each exam, Mr. Ratburn will bring some snacks for his students, but the type of the snack will depend on the class average.

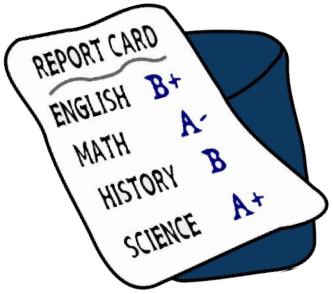
Practice Problem 3!

If the class average is 40 or below, he'll bring in lollipops, and if it is greater than 40, but 90 or below, then he'll bring cookies. When it is greater than 90, he'll bring ice cream.

You can help Mr. Ratburn determine what snack to bring. Write a program that asks for the class average and determines and prints the snack that Mr. Ratburn needs to bring.

'''

Practice Problem 4!



Multiple Conditions

'''Mr. Ratburn is preparing the quarterly report card. You can help Mr. Ratburn do the grade assignment.

Write a program that asks for the mark and then assigns the grade based on the following table:

```
[0, 50] grade is F
(50,60] grade is D
(60,70] grade is C
(70,80] grade is B
(80,100] grade is A
```

A parenthesis) or (indicates that the endpoint value ***is not included***.
A bracket] or [indicates that the endpoint value ***is included***.

The program should proceed with grade assignment only if mark is in the valid range of [0 - 100] otherwise it should print the message *'Mark is not valid'*
'''

Practice Problem 5!

Multiple Conditions

'''Mr. Ratburn wants to keep track of students who participate in math class. He recorded their participation using the following letters:

A means student **always** participated
U means student **usually** participated
S means student **sometimes** participated
R means student **rarely** participated
N means student **never** participated

As Mr. Ratburn was preparing the quarterly report, he decided to increase their quiz mark by **20%** if they have **A** for participation, **15%** if they have **U** for participation, **10%** if they have **S** for participation, **5%** if they have **R** for participation and by **0%** if they have **N** for participation.

Practice Problem 5!

```
'''Create a program that takes in the quiz mark and
the participation level. The program increases the
quiz marks based on the participation level and prints
the updated quiz mark.


If the quiz mark is less than 50 or the participation is
N then program displays the message
"Quiz mark remains unchanged".
'''
```