Control Flow using \texttt{if}, \texttt{elif} and \texttt{else}

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ANNOUNCEMENT:

- THE OFFICE OF ACCESSIBILITY RESOURCE CENTER IS LOOKING FOR A STUDENT IN THIS CLASS TO VOLUNTEER TO PROVIDE NOTES FOR THIS CLASS. THE STUDENT WILL BE PAID A ($75) STIPEND FOR THE SEMESTER.

- INTERESTED STUDENT SHOULD COME BY OUR OFFICE AT 2021 MESA VISTA HALL TO COMPLETE THE REQUIRED HIRING PAPERWORK.
Proof Lab 1 and 2 Are Too Easy

Assignment (=)   Comparison (==)

1) bank = 110
2) bank = bank - 50
3) item = "lobster"
4)
5) print(bank)
6) print(bank == 110)
7) print(bank == 60)
8) print(bank == (110 - 50))
9) print(bank == item)
10) print(item == "tasty")
11) print(item == "lobster")
Comparison Operators

<table>
<thead>
<tr>
<th>Operator</th>
<th>Question Asked</th>
</tr>
</thead>
<tbody>
<tr>
<td>==</td>
<td>is left equal to right?</td>
</tr>
<tr>
<td>&gt;</td>
<td>is left greater than right?</td>
</tr>
<tr>
<td>&gt;=</td>
<td>is left greater than or equal to right?</td>
</tr>
<tr>
<td>&lt;</td>
<td>is left less than right?</td>
</tr>
<tr>
<td>&lt;=</td>
<td>is left less than or equal to right?</td>
</tr>
<tr>
<td>!=</td>
<td>is left not equal to right?</td>
</tr>
</tbody>
</table>

1) `print(10 == 20)` ← False
2) `print(10 > 20)` ← False
3) `print(10 < 20)` ← True
4) `print(10 != 20)` ← True

Quiz: What is the Output?

1) damage = 66
2) health = 60
3) health = health - damage
4) `print(health == 0)`
5) `print(health >= 0)`
6) `print(health < 0)`

a) False
   False
   True
b) True
   False
   False
c) False
   True
   False
d) True
   True
   False
e) False
   False
   False
The **if** Statement

1) `name = input('What is your Name?')`
2) `if (name == 'Joel'):`
   
   ```python
   print('Great Name')
   print('You are the best!')
   ```

3) `print('Good Bye')`

Indented lines are form a **code block**.

The lines in this code block only execute if the logical expression in line 2 is **True**.

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**if** Statement: What is Wrong?

1) `name = input('What is your Name?')`
2) `if (name == 'Joel')`
3) `print('Great Name')`
4) `print('You are the best!')`
5) `print('Good Bye')`

line 2
   ```python
   if (name == "Joel")
   ```

SyntaxError: invalid syntax
if Statement: What is Wrong?

1) name = input('What is your Name?')
2) if (name == 'Joel')
3)   print('Great Name')
4)   print('You are the best!')
5) 
6) print('Good Bye')

line 4
   print("You are the best!")
^
IndentationError: unexpected indent

if Statement: What is Wrong?

1) grade = input('Enter Grade:')
2) 
3) if (grade >= 72):
4)   print('Huzzah!')
5)   print('You Passed!')
6)   print('Have a cookie.')
7) 
8) print('Good bye')

Enter Grade:78
line 3, in <module>
    if (grade >= 72):
      TypeError: unorderable types: str() >= int()
The **if** Statement

1) \( \text{grade} = \text{input('Enter Grade:')} \)
2) \( \text{grade} = \text{int(grade)} \)
3) 
4) \( \text{if (grade} \geq 72): \)
5) \( \quad \text{print('Huzzah!')} \)
6) \( \quad \text{print('You Passed!')} \)
7) \( \quad \text{print('Have a cookie.'}) \)
8) 
9) \( \text{print('Good bye')} \)

`def foo(grade):
    if (grade < 70): print('See you fall 2012')
    elif (grade <= 79): print('You get a C')
    elif (grade <= 89): print('You get a B')
    else: print('You get an A')`

*One and only one* of the **print** statements executes.

```python
>>> foo(71)
You get a C
```

```python
>>> foo(92)
You get an A
```
def foo(grade):
    if (grade < 70):
        print('See you fall 2012')
    elif (grade <= 79):
        print('You get a C')
    elif (grade <= 89):
        print('You get a B')
    else:
        print('You get an A')
    print('Done')

>>> foo(88)
You get a B
Done

One and only one of these blocks executes.

def foo(grade):
    if (grade <= 89):
        print('You get an A')
    elif (grade <= 79):
        print('You get a C')
    elif (grade <= 89):
        print('You get a B')
    else:
        print('do it again')
    print('Done')

>>> foo(88)
You get a B
Done

One and only one of these blocks executes.
Quiz: **if, elif and else Blocks**

```python
def moo(x, y):
    if (x + y < 10):
        print('less than 10. ')
    elif (x + y < 20):
        print('less than 20. ')
    elif (x + y < 30):
        print('less than 30. ')
    else:
        print('30 or more. ')
```

What is the output of the command:
```python
>>> moo(7, 8)
```

(a) less than 20.  (b) less than 10.  (c) less than 20. less than 20. less than 30.

---

The **if and else**

```python
1) grade = input('Enter Grade:')
2) grade = int(grade)
3)
4) if (grade >= 72):
5)     print('Huzzah! ')
6)     print('You Passed! ')
7)
8) else:
9)     print('It sucks to be you. ')
10)
11) print('Good Bye ')
```
What is Wrong?

1) grade = input('Enter Grade:')
2) grade = int(grade)
3)
4) if (grade >= 90):
   5) print('Huzzah! You get an A. ')
6) elif (grade >= 80):
   7) print('Great Job. You get a B. ')
8) elif (grade >= 70):
   9) print('Nice Work. You get a C. ')
10) else:
    11) print('It sucks to be you. ')
12) print('Good Bye')

The if, elif and else

1) grade = input('Enter Grade:')
2) grade = int(grade)
3)
4) if (grade >= 90):
   5) print('Huzzah! You get an A. ')
6) elif (grade >= 80):
   7) print('Great Job. You get a B. ')
8) elif (grade >= 70):
   9) print('Nice Work. You get a C. ')
10) else:
    11) print('It sucks to be you. ')
12) print('Good Bye')
What is Wrong?

1) grade = input('Enter Grade:')
2) grade = int(grade)
3)
4) if (grade >= 70):
5)     print('Nice Work. You get a C."
6) elif (grade >= 80):
7)     print('Great Job. You get a B.")
8) elif (grade >= 90):
9)     print('Huzzah! You get an A.")
10) else:
11)     print('It sucks to be you."
12) print('Good Bye"

Quiz: What is the output?

a = 77
b = 88

if (a > b):
    print('Hooch')
if (a < b):
    print('Quirrell')
if ((a + b) > 100):
    print('Sprout')
if ((a - b) < 0):
    print('Pomfrey')
Quiz: What is the output?

```python
a = 77
b = 88
if (a > 0):
    print('Lupin')
elif (b > 0):
    print('Lovegood')
elif ((a + b) > 0):
    print('Umbridge')
elif ((a * 2) > 0):
    print('Chang')
```

Quiz: What is the output?

```python
age = 15
if (age < 18):
    print('bob')
else:
    print('paul')
if (age > 10):
    print('bill')
else:
    print('scott')
```
Quiz: What is the output?

```python
age = 15
if (age < 18):
    print('bob')
else:
    print('paul')

if (age > 10):
    print('bill')
else:
    print('scott')
```

Note: Indenting is different than last quiz!

a) bob
b) paul
  bill
c) paul
  scott
d) bob
  bill
e) bob
  paul
  bill
  scott

Using the Debugger in PyCharm

1) Set a Breakpoint.
2) Start the Debugger.
3) Add variables to Watch List.
4) Walk through the program execution with "Step Over".