Selection

Boolean
• Built-in type
• Only 2 possible values:
  • True
  • False

Relational Operators
• ==
• !=
• >
• >=
• <
• <=

What is the output of the following code?

```python
a = 3
b = (a != 3)
print(b)
```

A. True  
B. False  
C. 3  
D. Syntax error

What is the output of the following code?

```python
p = (.3 == .1 + .2)
print(p)
```

A. True  
B. False  
C. .3  
D. Syntax error
Logical Operators

• **and**
  - Given two bools, return True only if both are True, otherwise False
• **or**
  - Given two bools, return True if at least one is True
• **not**
  - Given True, return False
  - Given False, return True

Which expression evaluates to True exactly when at least one of the following is true:
- a and b are equal
- a has a value of 5

A. a == b == 5
B. a == b or a == 5
C. a == b and a == 5
D. a == (b == 5)

What is the value of the expression at the bottom of the following code:
```python
a = True
b = False
c = True
not a and b or c
```

A. True
B. False

Write a boolean expression that evaluates to True if age indicates a teenager. (Assume age has been previously defined.)

- 13 <= age <= 19
- 12 < age < 20
- 13 <= age and 19 >= age
- (13 <= age) and (age <= 19)

Example: Leap Year

• Write a single expression that determines whether or not a previously defined year is a leap year
  - A leap year is:
    - Divisible by 4 and not divisible by 100
    - Divisible by 400

Selective Execution: Simple if

• if statements execute their statements selectively, based on a boolean condition
• If statement pattern:
  ```python
  if (condition):
  statements
  ```
  where condition is a boolean expression and statements are 1 or more valid statements
Examples

**x = 1**
if (x < 3):
    print (x)
    x = x + 4
    print (x)

**x = 47**
if (x > 90 and x < 20):
    print ('Computers are useless.')

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Selection: The Two-Branch if

The second form of if statement includes an else clause and a second statement:

if (condition):
    statements
else:
    statements

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Examples

**x = 1**
if (x < 3):
    print (x)
elif (x > 2):
    x = -3
    print (a)  
elif (x <= 2):
    x = 3
    print (c)
elif (x == 2):
    print (d)

What is the value of x after this code runs?

A. -3  B. 1  C. 2  D. 3  E. 5

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Examples: Nested Ifs

**x = 12**
if (x < 20):
    if x > 10
        print ('First solve')
    else:
        print ('the problem')
else:
    print ('Then write the code.')

---

Examples

```python
x = int(input("Enter your score:"))
if (x >= 90):
    print ("You’ve got an A")
elif (x >= 80):
    print ("You’ve got a B")
else:
    print ("Keep studying!")
```

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Selection: The Multi-branch if

The final form: if-elif-else statements:

if (cond):
    stmts
elif (cond):
    stmts
...
eiff (cond):
    stmts
else:
    stmts

---
Fixed?

```python
x = int(input("Enter your score:"))
if (x >= 60):
    print ("You've got a D")
elif (x >= 70):
    print ("You've got a C")
elif (x >= 80):
    print ("You've got a B")
elif (x >= 90):
    print ("You've got an A")
else:
    print ('Keep studying!')
```

```python
age = int(input("Enter your score:"))
if (age < 18):
    print ("minor")
elif (age >= 18 and age < 30):
    print ("adult")
elif age >= 30:
    print("middle aged")
else:
    print ('ageless')
```

Which code can be removed without changing what the code does?
A. The red can be removed
B. The blue can be removed
C. Both red and blue can be removed
D. Nothing can be removed

Examples

- Complete the following code to find the max of x, y and z. Do not use the built-in max function.

```python
x = int(input("Enter value 1:"))
y = int(input("Enter value 2:"))
z = int(input("Enter value 3:"))
myMax=None
<your code here>
print('The maximum value is:',myMax)
```

Write a program that prompts the user to enter a pH value. Then, print an indication of whether the pH given indicates an acid (value < 7.0), base (value > 7.0) or neutral (value is 7.0) substance.

pH values range from 0 to 14. Update your program so that only valid pH values are considered.