Conditions and if/else

Conditions

score > 90

- Evaluates to true (1) or false (0)
- Generally …

  variable operator variable

  variable operator constant

Comparison Operators

- <

- >

- <=

- >=

- ==
  - NOT the same as =

- !=

Examples

- x=5   y=8   z=5   MAX=10   initial='s'

```
x<y
y>MAX
x<=z
z>=MAX
initial=='r'
x!=z
```

Logical Operators

- and
- or
- not

- x=5   y=8   z=5   MAX=10   initial='s'

```
x<y and z>MAX
x<y or z>MAX
not(x>y)
```

Precedence

- function calls
- unary operators and binary power (-, **)
- * / %
- + -
- < <= >= > == !=
- not
- and
- or

Short-Circuit Evaluation

- Stop evaluation when true/false value is determined

- x=6   y=9

```
x>2 or y > 13
x<2 and y>13
```

Logical Assignment and Negation

```
in_range = (x>0 and x<=10) # 1 if x between 1-10, 0 otherwise
in_range = 0<x<=10 #Java does not allow this!!!


same_initials = (first_initial=='S'and last_initial=='R')

not_same_initials = not(first_initial=='S'and last_initial=='R')
not_same_initials = (first_initial!='S' or last_initial!='R')
```

DeMorgan's Theorem

- not(a and b) => (not(a) or not(b))

- not(a or b) => (not(a) and not(b))

Exercises

1. Determine the results of the following statements given `a=6 b=9 c=12 d=-7 e=0 f=12`:

   ```
   1.  print a > d
   2.  print c <= f
   3.  print d > e
   4.  print c = f
   5.  print c == f
   6.  print c > b and e > f
   7.  print c > b or e > f
   8.  print a or e
   9.  print e and a
   ```

if Statement

- Statements **MUST** be indented

```
if condition:
    statements


if age >= 16:
    print "You can get a driver's license."


if age > 21:
    print "You can purchase alcohol."
    print "You can gamble."


if age >= 16 and age < 21:
    print "You can drive but you cannot gamble."
```

if/else Statement

```
if condition:
    statements
else:
    statements

if grade > 60:
    print "You passed the class."
    print "Next up, CS112."
else:
    print "Sorry, you did not pass."
    print "Try again next semester."
```

Nested if Statements

```
if condition:
    if condition:
        statement
    else:
        statement
else:
    statement


if grade > 60:
        print "You passed the class."
        if grade > 90:
                print "You passed with an A!"
else:
        print "Sorry, you did not pass."
```

Example

```
if num > 0 and num <= 10:
    print "Your number is between 1 and 10"
else:
    if num > 10:
        print "Your number is too high"
    else:
        print "Your number is too low"
```

Chained Conditionals

```
if num > 0 and num <= 10:
    print "Your number is between 1 and 10"
else:
    if num > 10:
        print "Your number is too high"
    else:
        print "Your number is too low"


if num > 0 and num <= 10:
    print "Your number is between 1 and 10"
elif num > 10:
    print "Your number is too high"
else:
    print "Your number is too low"
```

Example

```
if grade > 60:
        print "You passed the class."
        if grade > 90:
                print "You passed with an A!"
else:
        print "Sorry, you did not pass."


#Does this work???
if grade > 60:
        print "You passed the class."
elif grade > 90:
        print "You passed with an A!"
else:
        print "Sorry, you did not pass."
```

Using Functions

```
def getGrade(score):
    if score > 90:
        return "A"
    elif score > 80:
        return "B"
    elif score > 70:
        return "C"
    elif score > 60:
        return "D"
    else:
        return "F"
```