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DEL
Lexicographic Order

- Strings are rated according to *lexicographic* order, *not* dictionary order.
- Words are ordered from A-Za-z
  - Capital letters first in alphabetical order
  - Lower-case letters second in alphabetical order
- This means **all** upper-case letters come before **all** lower-case letters.
Logical Operators: \textit{and}, \textit{or}, and \textit{not}

If $b_1$ \textbf{and} $b_2$ are Boolean \textbf{expressions}:

- $b_1$ \textbf{and} $b_2$ is True if both $b_1$ and $b_2$ are True, otherwise False

- $b_1$ \textbf{or} $b_2$ is True if either $b_1$ and $b_2$ (or both) are True, otherwise False

- not $b_1$ is True if $b_1$ is False, or False if $b_1$ is True
Conditionals
Conditionals

*Conditional* statements give you the ability to specify different instructions based on whether or not a specified condition is met.

Test for the condition (to see if it's true)

- If condition is met, perform the action
- If condition is not met, skip the action
The Python conditional statement: `if`

```python
def main():
    command
    command
    if <condition> :
        command
        command
        command
    command
    command
main()
```

Statements not dependent on the condition

Statements only executed if the condition is true

Statements not dependent on the condition

note the colon (":")

Indentation is very important!
In-class exercise

Write a complete program that asks the user to enter an integer.

If the number is 9, print a message indicating that they entered your favorite number. Then, on a separate line, print out the square of the number entered by the user.

If the number is NOT 9, do nothing.
The if-else statement

if <condition> :
    command
    command
    command
else :
    command
    command
    command

Statements only executed if the condition is true

Statements only executed if the condition is false

Statements not dependent on the condition

• Note the two colons (":")
• Note the indentation
Even / Odd Exercise

Write a complete program that asks the user to enter a number.

• If the number is even, print the number, followed by “is even”.
• If the number is odd, print the number, followed by “is odd”.

Hint: use the remainder operator “%”!
Exercise: Do you want fries with that?

Write a complete program that does the following:

Welcome to Gonzo Burger!

Enter a “1” if you want a hamburger, or a “2” if you want a cheeseburger.

Order: 2

Thank you! Next, enter a “1” if you want a Coke, or a “2” if you want a Sprite.

Order: 1

Thank you! You ordered:

- Cheeseburger
- Coke
The **if-elif-else** statement

```python
if <condition> :
    command
    command
    command

elif <condition> :
    command
    command

elif <condition> :
    command
    command

else :
    command
    command
    command
```

You can have as many of these blocks as you like

These statements are only executed if all of the conditions fail
What is the expected output?

```python
if (125 < 140):
    print ("first one")
elif (156 >= 140):
    print ("second one")
else:
    print ("third one")
```
Gotchas with conditionals

Exactly one of the clauses of an `if-elif-else` statement will be executed

- Only the first `True` condition
- Think carefully about the construction of your `if` statements before coding
- Think about a flowchart: you will only follow ONE arrow at a time
What is the expected output?

```python
x = 1 - (8/9)

if(x == (1/9)):
    print ("It’s one-ninth")
else:
    print ("It’s not one-ninth")
```
Arithmetic with floating-point numbers is not necessarily exact!

- \( \frac{1}{9} = .111111111111111 \ldots \) out to infinity
- But a computer can’t and won’t store an infinite number of digits. It will have some fixed number of 1s.
- Therefore, \( .1111111 \ldots + .8888888 \ldots \) does not add up to exactly 1.

When you want to compare two floating-point numbers, it is better to test to see if they differ by a sufficiently small amount.

```c
if ( (x - (1/9)) < .000001):
```
You can put if statements inside the body of the if (or elif or else) statement:

```python
if(<condition>):
    if(<some other condition>):
        command
    else:
        command
else:
    ...
```
Generalized Operator Precedence

( )                     parentheses for grouping
+ , -                   unary (signs)
**                       exponentiation
not                      logical not
* / // %                binary operators for mult/div/intdiv/mod
+ -                      binary operators for add/sub
< <= > >=               relational operators for inequality
== !=                   equality
and                      logical and
or                       logical or
= += -= *= /= // /= %=  assignment operators