Boolean expressions; Conditionals

COSC 101, 2018-02-02

Announcements
● Homework #1 due next Thursday @ 11pm

Outline
● Warm-up
● Homework overview
● Boolean expressions
● Conditional statements
● Programming practice

Warm-up
Write a program that plays a short game of mad libs: ask for three words and fill them in a sentence. (E.g., Ze verb the adjective noun.)
verb = input("Verb:")
adjective = input("Adjective:")
noun = input("Noun:")
print("Ze", verb, "the", adjective, noun, ".")

Homework overview

Boolean expressions
● How many boolean values are there? --- True, False
● Which of the following are valid boolean expressions?
  a. True
     Yes
  b. "True"
     No --- "True" is a string
  c. 1 < 2
     Yes
  d. 3 = 3
     No --- use double equals for comparison
  e. 4 >= 4
     Yes
● What does each of the following boolean expressions evaluate to?
  a. True and False
     False
  b. False or False
     False
  c. True and not False
     True
  d. not True or not False
     True
  e. True or False and False
     True
f. (True or False) and False
   False

- Order of precedence
  - Parenthesis: ()
  - Math:
    - **
    - *, /, //, %
    - +, -
  - Comparison: ==, !=, <, >, <=, >=
  - not
  - and
  - or

Assume the following assignment statements have been executed:
x = -2
y = 0
z = 5

What does each of the following boolean expressions evaluate to? If the expression is an invalid boolean expression, describe why.

a. x < 0 and y < 0
   False
b. z == 4 or 5
   Invalid --- should have written: z == 4 or z == 5
c. z > 3 and z < 7
   True
d. y not == 0
   Invalid --- should have written: y != 0
e. x < y or (z >= 0 and y <= 5)
   True
f. x + y < z
   True
g. x > y == False
   True
h. "a" < "b"
   True
i. "b" < "C"
   False --- comparison is based on lexicographic order

Conditional statements

- Used to influence program’s behavior based on the result of a boolean expression
- If statement --- execute one set of instructions when the specified boolean expression is true and execute a different set of instructions when the expression is false
  - if _boolean expression:_
    - statements when true
  - else:
    - statements when false
- Statements must be indented
- Sequence of execution is non-linear
  - Only execute one set of statements, based on the result of the boolean expression
- Skip over other set of statements
- Example:
  ```python
  print("This is always first")
  if (x > 0):
      print("Expression is true")
      print("Hooray!")
  else:
      print("Expression is false")
      print("Uh-oh!")
  print("This is always last")
  ```
- Drawing a flowchart is useful

- Else clause is optional
- Example:
  ```python
  print("This is always first")
  if (x > 0):
      print("Expression is true")
      print("This occurs sometimes")
      print("This is always last")
  ```
- Drawing a flowchart is useful
What output is produced by each of the following programs?

a. groundhog_saw_shadow = True
   if (groundhog_saw_shadow):
       print("6 more weeks of winter!")
   else:
       print("Spring is here!")
   print("Are you sure?")
Output:
6 more weeks of winter!

b. looks_like_duck = True
   quacks_like_duck = True
   print("What do you think?")
   if (looks_like_duck and quacks_like_duck):
       print("It's probably a duck")
   print("It's not a duck")
Output:
It's probably a duck
It's not a duck