COSC 1336 Homework 3

Relevant reading: Chapter 4

Due: Sep. 27, 2:30 pm

(Late date: Oct. 4, 2:30 pm)

35 Points

Problem 1. [**5 points**] For each of the following, fill in the blank so that the sentence is true.

1. A(n) _____ expression has a value that is either true or false.
2. A(n) _____ structure tests a condition and then takes one path if the condition is true or another if the condition is false.
3. The symbols `<`, `>`, and `==` are all _____ operators.
4. `and`, `or` and `not` are _____ operators.
5. A Boolean expression created with the _____ operator is true if either of its subexpressions is true.

Problem 2. [**10 points**] For each of the following, choose **all** that are true. **More than one answer may be true!**

1. Which of the following operators tests for equality Python?

   a. `!=`
   b. `=`
   c. `==`
   d. `is`

2. If an expression does not contain any parentheses, which of the following operators is performed first in the expression?

   a. arithmetic
   b. comparison
   c. logical
   d. it depends on the expression

3. The expression `4 * 3 < 6 + 7 and 7 < 6 + 9` evaluates to

   a. `True`
   b. `False`

4. Which of the following Python conditions should you use in an `if` statement to determine whether the `age` variable represents the age of a person who is in his or her twenties.

   a. `20 <= age < 30`
   b. `20 <= age and age < 30`
   c. `20 <= age or age < 30`
   d. `age < 30 and >= 20`

5. Which of the following conditions should you use in an `if` statement to determine whether the `item` variable is the same as either the word Chair or the word Desk?

   a. `item == "Chair" or "Desk"`
   b. `item = "Chair" or "Desk"`
   c. `item == "Chair" or item == "Desk"`
   d. `item = "Chair" or item = "Desk"`

6. Which of the following `if` statements will assign 20 the variable `y` if the variable `x` is greater than 100?

   a.
   ```
   if x > 100:
       y = 20
   ```
   b.
   ```
   if not x <= 100:
       y = 20
   ```
   c.
   ```
   if x not <= 100:
       y = 20
   ```
   d.
   ```
   if not x < 100:
       y = 20
   ```

Problem 3. [**8 points**] Assume the variable initializations given below have been performed. For each of the following Boolean expressions, determine what will be printed by the given piece of code.

```
shouldContinue = False
num1 = 15.0
num2 = 4
```

a.
```
if shouldContinue == True:
    print("Continuing...")
else:
    print("Done.")
```

b.
```
if shouldContinue:
    print("Continuing...")
else:
    print("Done.")
```

c.
```
if (num1 > num2) || (shouldContinue == ((num1 / num2) < num2)):
    print("Message 1")
else:
    print("Message 2")
```

d.
```
if shouldContinue && (num1 * num2 > (num2 * num2 * num2) / num1):
    print("Apple")
else:
    print("Banana")
```

Problem 4. [**12 points**] Given three integer variables `num1`, `num2` and `num3`, write Python Boolean expressions that evaluate to `True` under the conditions described, and `False` otherwise. You do not need to write a complete Python instruction, and certainly not a whole program. The expression should be something that could be used as a condition in a selection statement, but you do not need to actually write the selection statement.

For example, if the problem said "the variables `num1` and `num2` are equal", a correct answer would be `num1 == num2`.

a. The variable `num3` is exactly twice the sum of the other two variables.

b. The variable `num1` is odd. Remember that a number is even if the remainder when the number is divided by 2 is zero. A number that is not even is odd.

c. The variable `num1` is either 1 or 2.

d. The variable `num1` is neither 1 nor 2.

e. Write a **different** expression for the same condition as the previous problem (`num1` is neither 1 nor 2).

f. The variable `num1` is the smallest and the variable `num3` is the largest, and none of the three variables are the same.