Advanced Programming: Homework- 2

تمرین شماره دو درس برنامه سازی پیشرفته

4.14 Exercises

1. What possible values can a Boolean expression have?

- True and False .

2. Where does the term Boolean originate?

- The term Boolean comes from the name of the British mathematician George Boole. A branch of discrete mathematics called Boolean algebra is dedicated to the study of the properties and the manipulation of logical expressions.

3. What is an integer equivalent to True in Python?

- It’s 1 .

4. What is the integer equivalent to False in Python?

- It’s 0 .

5. Is the value -16 interpreted as True or False?

- It’s True .

6. Given the following definitions:

x, y, z = 3, 5, 7

evaluate the following Boolean expressions:

(a) x == 3 ➔ True

(b) x < y ➔ True

(c) x >= y ➔ False

(d) x <= y ➔ True

(e) x != y – 2 ➔ False

(f) x < 10 ➔ True

(g) x >= 0 and x < 10 ➔ True

(h) x < 0 and x < 10 ➔ False

(i) x >= 0 and x < 2 ➔ False

(j) x < 0 or x < 10 ➔ True

(k) x > 0 or x < 10 ➔ Ture

(l) x < 0 or x > 10 ➔ False

7. Given the following definitions:

x, y = 3, 5

b1, b2, b3, b4 = True, False, x == 3, y < 3

evaluate the following Boolean expressions:

(a) b3 ➔ True

(b) b4 ➔ False

(c) not b1 ➔ False

(d) not b2 ➔ True

(e) not b3 ➔ False

(f) not b4 ➔ True

(g) b1 and b2 ➔ False

(h) b1 or b2 ➔ True

(i) b1 and b3 ➔ True

(j) b1 or b3 ➔ True

(k) b1 and b4 ➔ False

(l) b1 or b4 ➔ True

(m) b2 and b3 ➔ False

(n) b2 or b3 ➔ True

(o) b1 and b2 or b3 ➔ True

(p) b1 or b2 and b3 ➔ True

(q) b1 and b2 and b3 ➔ False

(r) b1 or b2 or b3 ➔ True

(s) not b1 and b2 and b3 ➔ False

(t) not b1 or b2 or b3 ➔ True

(u) not (b1 and b2 and b3) ➔ True

(v) not (b1 or b2 or b3) ➔ False

(w) not b1 and not b2 and not b3 ➔ False

(x) not b1 or not b2 or not b3 ➔ True

(y) not (not b1 and not b2 and not b3) ➔ True

(z) not (not b1 or not b2 or not b3) ➔ False

8. Express the following Boolean expressions in simpler form; that is, use fewer operators. x is an integer.

(a) not (x == 2) ➔ x != 2

(b) x < 2 or x == 2 ➔ x <= 2

(c) not (x < y) ➔ x !< y

(d) not (x <= y) ➔ x !<= y

(e) x < 10 and x > 20 ➔ 20 < x < 10

(f) x > 10 or x < 20 ➔ 10 < x < 20

(g) x != 0 ➔ not (x == 0)

(h) x == 0 ➔ x = 0

9. Express the following Boolean expressions in an equivalent form without the not operator. x and y are integers.

(a) not (x == y) ➔ x != y

(b) not (x > y) ➔ x !> y

(c) not (x < y) ➔ x !< y

(d) not (x >= y) ➔ x !>= y

(e) not (x <= y) ➔ x !<= y

(f) not (x != y) ➔ x == y

(g) not (x != y) ➔ x == y

(h) not (x == y and x < 2) ➔ x != y and x !< 2

(i) not (x == y or x < 2) ➔ x != y or x !< 2

(j) not (not (x == y)) ➔ ! (x != y)

10. What is the simplest tautology?

- True .

11. What is the simplest contradiction?

- False .

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12. Write a Python program that requests an integer value from the user. If the value is between 1 and 100 inclusive, print ”OK;” otherwise, do not print anything.

13. Write a Python program that requests an integer value from the user. If the value is between 1 and 100 inclusive, print ”OK;” otherwise, print ”Out of range.”

14. Write a Python program that allows a user to type in an English day of the week (Sunday, Monday, etc.). The program should print the Spanish equivalent, if possible.

15. Consider the following Python code fragment:

```
# i, j, and k are numbers
if i < j:
if j < k:
i = j
else:
j = k
else:
```

```
if j > k:
j = i
else:
i = k
print("i =", i, " j =", j, " k =", k)
```

What will the code print if the variables i, j, and k have the following values?

(a) i is 3, j is 5, and k is 7

(b) i is 3, j is 7, and k is 5

(c) i is 5, j is 3, and k is 7

(d) i is 5, j is 7, and k is 3

(e) i is 7, j is 3, and k is 5

(f) i is 7, j is 5, and k is 3

16. Consider the following Python program that prints one line of text:

```
val = int(input())
if val < 10:
if val != 5:
```

```
print("wow ", end='')
else:
val += 1
else:
if val == 17:
val += 10
else:
print("whoa ", end='')
print(val)
```

What will the program print if the user provides the following input?

(a) 3

(b) 21

(c) 5

(d) 17

(e) -5

17. Consider the following two Python programs that appear very similar:

```
n = int(input())
if n < 1000:
    print('*', end='')
if n < 100:
    print('*', end='')
if n < 10:
    print('*', end='')
if n < 1:
    print('*', end='')
print()
```

```
n = int(input())
if n < 1000:
    print('*', end='')
elif n < 100:
    print('*', end='')
elif n < 10:
    print('*', end='')
elif n < 1:
    print('*', end='')
print()
```

How do the two programs react when the user provides the following inputs?

(a) 0

(b) 1

(c) 5

(d) 50

(e) 500

(f) 5000

Why do the two programs behave as they do?

18. Write a Python program that requests five integer values

from the user. It then prints the maximum and minimum values entered. If the user enters the values 3, 2, 5, 0, and 1, the program would indicate that 5 is the maximum and 0 is the minimum. Your program should handle ties properly; for example, if the user enters 2, 4 2, 3 and 3, the program should report 2 as the minimum and 4 as maximum.

19. Write a Python program that requests five integer values from the user. It then prints one of two things:

if any of the values entered are duplicates, it prints "DUPLICATES"; otherwise, it prints "ALL UNIQUE

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