LAB 6

Python:
Logic and Conditions

Learning goals:
Understand relational expressions and logical operators.
Learn vectorized logic.
Use conditional statements.

6.1 Relational expressions and logical operators

1. For each of the relational expressions below, first think through what the answer should be, then type it into Python and see if you were right. If you run into an error, re-write the code to make it valid. If there are new functions or new applications of familiar commands, figure out and explain what is going on. Report your answers and explanations as comments.

a. `5 > 8`

b. `a1 = 5 < 10`

c. `a2 = 5 > 10`

d. `y = (6 < 10) + (7 > 8) == (5*3 == 60/4)`

e.
```
b = array([15,6,9,4,11,7,14])
c = array([8,20,9,2,19,7,10])
c >= b
b == c
b != c
q = b - c > 0
any(q)
all(q)
```

f.
```
A = array([[2,9,4],[-3,5,2],[6,7,-1]])
A <= 2
```

g.
```
r1 =[8,12,9,4,23,19,10]
r1 <= 10
r2 = array([8,12,9,4,23,19,10])
s2 = r2 <= 10
r2[s2]
r2[r2 <= 10]
x = where(r2 <= 10)
```
what is the difference between `x` *and* `s2` *?*
```
r2[x]
r2[where(r2 <= 10)]
where(r2 <= 10, 7.0, -3.0)
4 in r2
```

h.
```
3 + 4 < 16 / 2
3 == (4 < 16) / 2
```

2. Now do the same for the following commands with logical operators:

a. `True or False`

b. `25*((True and False) + (not False) + (False or True))`

3. Now do the same for the following mixture of relational expressions and logical operators:

a.
```
bb, cc = -2,5
-5 < bb < -1
-5 < bb and bb < -1
not cc < 7
(not cc) < 7
not ((cc >= 8) or (bb < -1))
not (cc >= 8) or (bb < -1)
```