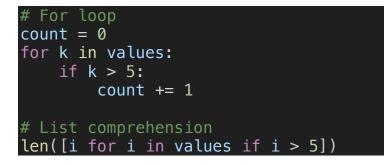
MR2020: Extra Practice Problems

1. Given an array called values:

values = np.array([5.7, 1.2, 9.3, 4.8, 7.6, 2.1, 0.9, 3.4, 6.5, 8.9])
Write a for-loop or list comprehension to create a variable 'count' that stores the
number of elements in 'values' that are greater than 5.



2. What is the value of B after the following code is executed?

```
B = 3
for i in range(4):
B += 3
```

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3. Create a list called 'num_list' that contains the numbers 1, 4, and 7.

 $num_list = [1, 4, 7]$

4. Create a tuple called num_tuple that contains the numbers 10, 20, and 30.

 $num_tuple = (10, 20, 30)$

5. Create a dictionary called location_data containing the following information:

Кеу	Value
State	California
Elevation	300
Population	500000

location_data = {'State':'California','Elevation':300,'Population':500000}

- 6. Write Python statements equivalent to the following English statements:
- a. x is equal to Y.



b. z is less than or equal to the median of a numpy array arr.



c. Y is greater than the minimum value in arr.



d. x is greater than y and y is greater than z.



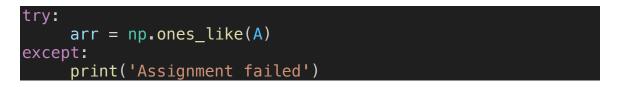
e. Either both x is equal to y and x is less than z or x is greater than z.

(X == Y and X < Z) or X > Z

7. Translate the following Python statements into written English:

```
a. (A + B) >= 5 and C < 2</li>
The sum of A and B are greater than or equal to 5 and C is less than 2.
b. X != Y - 2
X is not equal to Y minus 2.
c. if Z > 10: Z -= 3
If Z is greater than 10, reassign Z itself minus 3.
d. A > B or A == 5
A is greater than B or A is equal to 5.
e. np.median(X[:, 1]) <= Y</li>
The median of the second column of X is less than or equal to Y.
```

8. Write a code snippet that attempts to create an array B filled with ones using np.ones_like(A) where A is another numpy array. Print "Assignment failed" if the operation fails.



9. Write a while loop that generates a random integer from 1 to 20 using random.randint(1, 20) and continues until the generated number is 15.

```
number = 0 # Initialize the variable to a value that isn't
15
while number != 15:
    number = random.randint(1, 20)
    print(number)
```

10. Suppose you have arrays of data for pressure (P) and wind speed (WS):

Write a function check_conditions that returns 1 if the pressure is below 1000 hPa and wind speed exceeds 20 m/s. Otherwise, return 0.

```
def check_conditions(P, WS):
    if P < 1000 and WS > 20:
        return 1
    else:
        return 0
```

11. Define a class called Rectangle that is initialized with the attributes length (float), width (float), and color (string). Add a method to the class that calculates the area of the rectangle. Then, create an object my_rectangle with length 15, width 10, and color "blue" in one line.

```
class Rectangle:
    def __init__(self, length, width, color):
        self.length = length
        self.width = width
        self.color = color
    def area(self):
        return self.length * self.width
my_rectangle = Rectangle(length=15, width=10, color="blue")
```

- 12. For each problem below, determine the output of the Python code snippet:
 - a.
- B = np.array([(1,4),(2,8)])
 B[1, 0]
 2
- b.
 - C = np.array([5,9,2,6,1,8,3,4,7])
 C[5:]
 - array([8,3,4,7])
- c.
 [k for k in range(6
 - [0, 1, 2, 3, 4, 5]
- d.

weather_info = {'temp': [20, 25, 30], 'wind': ['Yes', 'No', 'Yes']}
weather_info['wind'][2]

'Yes'

13. Create a list called heights that contains the numbers 150, 165.2, 170, and 180.5 in that order.

heights = [150,165.2,170,180]

14. Create a tuple called weights that contains the numbers 60, 75.5, 82, and 70.3 in that order. weights = (60, 75.5, 82, 70.3)

15. Create a dictionary called book info containing the following information:

Кеу	Value
Title	List containing elements '1984' and 'Brave
	New World'
Author	List containing elements 'Orwell' and 'Huxley'

bookinfo = {'Title':['1984','Brave New World'],'Author':['Orwell','Huxley']}

16. Given the following Python set and the print statement:

fruits = {'apple', 'banana', 'apple', 'orange', 'banana'}
print(fruits)

What would you expect to see as the result of print(fruits)?

```
{'orange', 'apple', 'banana'}
```

17. What would the following code return for the variable B?

B = 1 for i in range(3): B += 2 B *= 2

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18. Write a Python comparison statement for each of the following English statements. Assume that numpy was imported as np.

a. The absolute difference between x and y is less than or equal to 5. Hint: Use np.abs()

np.abs(X-Y) <= 5

b. M is greater than or equal to the square root of N. Use np.sqrt(N).

M >= np.sqrt(N)

c. z is positive, or both P and Q are greater than or equal to 20.

Z > 0 or (P >= 20 and Q >= 20)

19. Translate the following Python statements to written English:

a. A % B == 0 and B > A // 2

The remainder when B is divided into A is 0 and B is greater than the floor of A divided by 2.

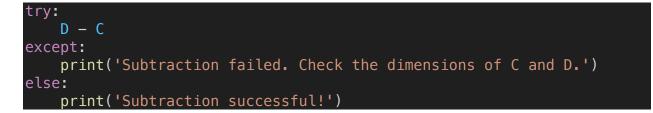
b. C.min() < D[:,0].min()</pre>

The minimum of C is less than the minimum of the first column of D.

c. if not A: C -= 3

If A is False, 0, or empty, then C is reassigned itself minus 3.

20. Write a Python code that tries to subtract C from D (i.e., D - C). If the subtraction fails, print "Subtraction failed. Check the dimensions of C and D." If the subtraction succeeds, print "Subtraction successful!"



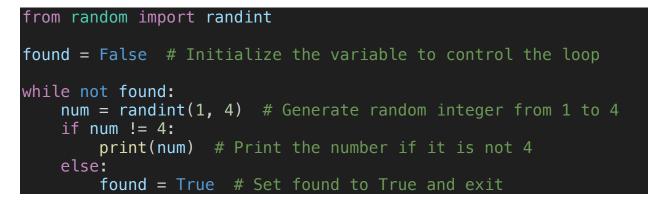
21. Assume you have the following code:

from random import randint

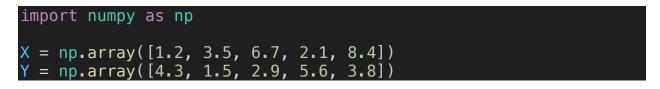
Use the following line of code inside a while loop

num = randint(1, 4)

If num is not 4, print the number. If num is 4, set a variable called found to True and exit the while loop.



22. Suppose you already have the following code:



Write a code that prints how many times the sum of corresponding elements in x and Y is less than or equal to 10.

(X + Y <= 10).sum()

or

np.sum(X + Y <= 10)

23. Define a class called WeatherStation that is initialized with the following attributes: temperature (float), pressure (float), humidity (float), and wind_speed (float). Add a method that calculates the wind chill using the formula:

 $WC = 13.12 + 0.6215 \times T - 11.37 \times V^{0.16} + 0.3965 \times T \times V^{0.16}$

where T is temperature and V is wind speed. Create an object station with temperature of 5, pressure of 1013, humidity of 85, and wind_speed of 10, then calculate the wind chill using this object. What answer do you get for the wind chill?

```
class WeatherStation:
    def __init__(self, temperature, pressure, humidity, wind_speed):
        self.temperature = temperature
        self.pressure = pressure
        self.pressure = pressure
        self.humidity = humidity
        self.wind_speed = wind_speed
    def calculate_wind_chill(self):
        T = self.temperature
        V = self.wind_speed
        # Wind chill formula
        WC = 13.12 + 0.6215 * T - 11.37 * (V ** 0.16) + 0.3965 * T * (V ** 0.16)
        return WC
station = WeatherStation(5,1013,85,10)
```

2.66

Write a function called calculate_heat_index that takes two input variables: T (temperature in degrees Fahrenheit) and RH (relative humidity as a percentage). The function should return the Heat Index (HI) using the following made-up formula:

 $HI = -42.379 + 2.049 \times T + 10.143 \times RH - 0.225 \times T \times RH$

The function should warn by printing a message if any special cases where the input values lead to extreme or unrealistic Heat Index values (for example greater than 135 degrees F).

```
def calculate_heat_index(T, RH):
    HI = -42.379 + 2.049*T + 10.143*RH - 0.225*T*RH
    if HI > 135:
        Warning('The heat index is very high.')
    return HI
```

25. For each separate, unrelated problem, determine what the following Python code snippets would return:

a.

B = np.array([(6,2,3,9),(7,5,1,4),(8,0,2,6)]) B[1, 2]

1

b.

B = np.array([2,4,6,8,10,12,14,16,18,20])
B[2:]

array([6, 8, 10, 12, 14, 16, 18, 20])

c.

B = np.array([2,4,6,8,10,12,14,16,18,20])
B[1:7]

array([4, 6, 8, 10, 12, 14])

d.

B = np.array([2,4,6,8,10,12,14,16,18,20])
B[::4]

array([2, 10, 10])

e.

data = {'season':[1,2,'0ffseason',4],'played':[False,True,True,False]}
data[season][2]

'offseason'