Python Data Science Homework #4

NOTICE: PRINT OUT THE ANSWERS DIRECTLY WILL NOT BE SCORED.

1. (20%)
   - Create an array ranging from 30 to 1.

```
array([30, 29, 28, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14,
       13, 12, 11, 10,  9,  8,  7,  6,  5,  4,  3,  2,  1])
```

   - Replace all odd numbers in the array with -1 and display the answer in the following form.

```
array([[30, -1],
       [28, -1],
       [26, -1],
       [24, -1],
       [22, -1],
       [20, -1],
       [18, -1],
       [16, -1],
       [14, -1],
       [12, -1],
       [10, -1],
       [ 8, -1],
       [ 6, -1],
       [ 4, -1],
       [ 2, -1]])
```

2. (20%)

   a = [1, 2, 3, 4, 5]

   b = [4, 5, 6, 7, 8]

   - Define functions to calculate the L1 and L2 distance between array a and b.

3. Create the data frame shown below.

	First_name	Last_name	Gender	Height(inch)	Weight(lbs)
0	allen	lin	M	72	130
1	johnny	Lin	M	69	205
2	Chloe	Huang	F	63	180
3	John	Chen	M	62	125
4	Alice	Chang	F	57	89

(10%)

- Combine ‘First_name’ and ‘Last_name’ into ‘Name’
- Set ‘Name’ as index
- Drop ‘First_name’ and ‘Last_name’

Hint: pay attention to the capitalization of the name

Name	Gender	Height(inch)	Weight(lbs)
Allen Lin	M	72	130
Johnny Lin	M	69	205
Chloe Huang	F	63	180
John Chen	M	62	125
Alice Chang	F	57	89
Bob Wang	M	69	160

(10%)

Calculate the BMI and add it as a new column.

Hint: pay attention to the unit

Name	Gender	Height(m)	Weight(kg)	BMI
Allen Lin	M	1.83	58.97	17.61
Johnny Lin	M	1.75	92.99	30.36
Chloe Huang	F	1.60	81.65	31.89
John Chen	M	1.57	56.70	23.00
Alice Chang	F	1.45	40.37	19.20
Bob Wang	M	1.75	72.57	23.70

(15%) Create a new feature to display physical condition based on BMI.

BMI < 18.5 → Light

18.5 <= BMI < 24 → Normal

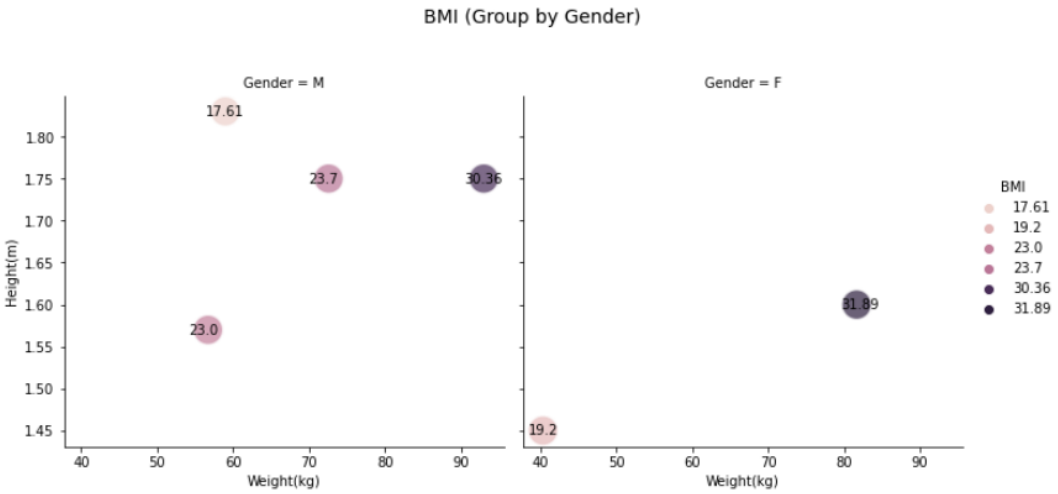
24 <= BMI → Heavy

Name	Gender	Height(m)	Weight(kg)	BMI	State
Allen Lin	M	1.83	58.97	17.61	Light
Johnny Lin	M	1.75	92.99	30.36	Heavy
Chloe Huang	F	1.60	81.65	31.89	Heavy
John Chen	M	1.57	56.70	23.00	Normal
Alice Chang	F	1.45	40.37	19.20	Normal
Bob Wang	M	1.75	72.57	23.70	Normal

(10%) Draw the scatter plot group by gender.

Notices:

- The BMI value needs to be marked on the chart
- Color depth is proportional to BMI



(15%) Draw the bar chart of BMI.

Notices:

- BMI < 18.5 → Light (green)
- 18.5 <= BMI < 24 → Normal (blue)
- 24 <= BMI → Heavy (red)
- Two vertical lines need to be added to indicate different ‘State’