**Question 1: [ 5 pts]**

For each of the following tasks, write **ONE-line** code to achieve it

1. Write in a one line code, a python code that calculates the average of grades of a **given** dictionary.

Sample Example:

grades = {‘math’: 1, ‘physics’: 2, ‘astro’: 3, ‘psycho’: 4, ‘PDE’: 5, ‘economics’: 6, ‘humanities’: 7}

Result should be: 4

1. Write a python code in one line code that is given a list and calculates the summation of only numbers at even indices.

Sample example:

x= 1 2 3 4 5 6 7

Result = 16

**Hint**: you can print the even indices by manipulating the **range()** function

**Question 2: [ 15 pts]**

**Instructions**:

1. Solve this problem in two separate files: one for the function and one for the script.
2. The function is not allowed to read any data from the user or print anything on the screen.

**Problem Description**

Differentiation and Integration: A student who studies mathematics class, has a problem in finding the derivative for a polynomial function, and its integral. For instance,

Has the following derivative

Also, the opposite occurs so

is the antiderivative of the same polynomial.

**Q2-1. [10 pts]**

**Requirement 1:** [10 points]

Write a single python function that takes the following arguments

1. List of polynomial terms; for instance terms=[2 3 2], such that terms[0] is the term beside x^0 and terms[1] is the term beside x[1] and so on.
2. Type of operation; 1 for differentiation, -1 for integration

If there is an integration, the function asks the command window to enter the additive constant (c).

**Q2-2. [5 pts]**

Call the function in a separate script to find the derivative and the integral of the following function, with additive constant of 3. The command window output must be similar to these input/output examples

**Input Output Examples**

**Enter polynomial terms: 2 3 2  
Choose Operation 1 derivative -1 antiderivative: 1  
Resulting polynomial terms: 3 4  
Do you need to show as a polynomial? No**

**Enter polynomial terms: 2 3 2  
Choose Operation 1 derivative -1 antiderivative: -1  
Enter integration constant: 10  
Resulting polynomial terms: 10 2 1.5 0.7  
Do you need to show as a polynomial? Yes  
Here it is:  
10 + 2 x + 1.5 x^2 + 0.7 x^3**

**Required Files:**

1. **Function file**
2. **Script file**
3. **Screenshot from the command window doing requirement 2**

**Question 3: [ 30 pts]Problem Description:**

Dalia is a CS student that doubts the common belief that high priced items must be of high quality. In order to check this belief she asks five of her friends on their opinion of 3 brands of shampoo:

1. Sparkle.
2. Pantene.
3. TreSemmee

She stored the data received from her friends in a text file called: “shampoo\_study.txt”

sparkle, 15, 6  
pantene, 45, 7  
tresemmee,70, 9  
sparkle, 14, 6  
pantene, 50, 9  
tresemmee,60, 9  
sparkle, 13, 6  
pantene, 40, 10  
tresemmee,80, 10  
sparkle, 30, 10  
pantene, 40, 2  
tresemmee,70, 8  
sparkle, 18, 9  
pantene, 43, 9  
tresemmee,77, 9

The first column is brand name, second column is price, and third column is rating out of 10, each of her 5 friends gave a ranking and an estimate of price in her neighborhood.

**Solution tips:**

1. All printed messages should be in another file called: “my\_study\_and\_some\_of\_my\_friends.txt”
2. Output in a file where you write: brand\_name, the average price of each brand, the average rank of each brand.
3. print the best brand name based on avg rank (highest rank).
4. print the best brand name based on the avg price (highest price).
5. If the same brand name in parts (3 and 4 above) are the same, print the following message: “High price equals high quality, very materialistic world : D”
6. If they are different, print “We live in heaven, lot of loves”.

**DONOT USE BUILT IN FUNCTIONS FOR SORTING.**