In [2]:
```python
#Import numpy
import numpy as np

#Seasons
Seasons = ["2010","2011","2012","2013","2014","2015","2016","2017","2018","2019"
Sdict = {"2010":0,"2011":1,"2012":2,"2013":3,"2014":4,"2015":5,"2016":6,"2017":7

#Players
Players = ["Sachin","Rahul","Smith","Sami","Pollard","Morris","Samson","Dhoni","
Pdict = {"Sachin":0,"Rahul":1,"Smith":2,"Sami":3,"Pollard":4,"Morris":5,"Samson"

#Salaries
Sachin_Salary = [15946875,17718750,19490625,21262500,23034375,24806250,25244493,
Rahul_Salary = [12000000,12744189,13488377,14232567,14976754,16324500,18038573,1
Smith_Salary = [4621800,5828090,13041250,14410581,15779912,14500000,16022500,175
Sami_Salary = [3713640,4694041,13041250,14410581,15779912,17149243,18518574,1945
Pollard_Salary = [4493160,4806720,6061274,13758000,15202590,16647180,18091770,19
Morris_Salary = [3348000,4235220,12455000,14410581,15779912,14500000,16022500,17
Samson_Salary = [3144240,3380160,3615960,4574189,13520500,14940153,16359805,1777
Dhoni_Salary = [0,0,4171200,4484040,4796880,6053663,15506632,16669630,17832627,1
Kohli_Salary = [0,0,0,4822800,5184480,5546160,6993708,16402500,17632688,18862875
Sky_Salary = [3031920,3841443,13041250,14410581,15779912,14200000,15691000,17182
#Matrix
Salary = np.array([Sachin_Salary, Rahul_Salary, Smith_Salary, Sami_Salary, Polla

#Games
Sachin_G = [80,77,82,82,73,82,58,78,6,35]
Rahul_G = [82,57,82,79,76,72,60,72,79,80]
Smith_G = [79,78,75,81,76,79,62,76,77,69]
Sami_G = [80,65,77,66,69,77,55,67,77,40]
Pollard_G = [82,82,82,79,82,78,54,76,71,41]
Morris_G = [70,69,67,77,70,77,57,74,79,44]
Samson_G = [78,64,80,78,45,80,60,70,62,82]
Dhoni_G = [35,35,80,74,82,78,66,81,81,27]
Kohli_G = [40,40,40,81,78,81,39,0,10,51]
Sky_G = [75,51,51,79,77,76,49,69,54,62]
#Matrix
Games = np.array([Sachin_G, Rahul_G, Smith_G, Sami_G, Pollard_G, Morris_G, Samso

#Points
Sachin_PTS = [2832,2430,2323,2201,1970,2078,1616,2133,83,782]
Rahul_PTS = [1653,1426,1779,1688,1619,1312,1129,1170,1245,1154]
Smith_PTS = [2478,2132,2250,2304,2258,2111,1683,2036,2089,1743]
Sami_PTS = [2122,1881,1978,1504,1943,1970,1245,1920,2112,966]
Pollard_PTS = [1292,1443,1695,1624,1503,1784,1113,1296,1297,646]
Morris_PTS = [1572,1561,1496,1746,1678,1438,1025,1232,1281,928]
Samson_PTS = [1258,1104,1684,1781,841,1268,1189,1186,1185,1564]
Dhoni_PTS = [903,903,1624,1871,2472,2161,1850,2280,2593,686]
Kohli_PTS = [597,597,597,1361,1619,2026,852,0,159,904]
Sky_PTS = [2040,1397,1254,2386,2045,1941,1082,1463,1028,1331]
#Matrix
Points = np.array([Sachin_PTS, Rahul_PTS, Smith_PTS, Sami_PTS, Pollard_PTS, Morr
```

In [3]:
```python
Salary
```

```
Out[3]:  array([[15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
                 25244493, 27849149, 30453805, 23500000],
                [12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
                 18038573, 19752645, 21466718, 23180790],
                [ 4621800,  5828090, 13041250, 14410581, 15779912, 14500000,
                 16022500, 17545000, 19067500, 20644400],
                [ 3713640,  4694041, 13041250, 14410581, 15779912, 17149243,
                 18518574, 19450000, 22407474, 22458000],
                [ 4493160,  4806720,  6061274, 13758000, 15202590, 16647180,
                 18091770, 19536360, 20513178, 21436271],
                [ 3348000,  4235220, 12455000, 14410581, 15779912, 14500000,
                 16022500, 17545000, 19067500, 20644400],
                [ 3144240,  3380160,  3615960,  4574189, 13520500, 14940153,
                 16359805, 17779458, 18668431, 20068563],
                [       0,        0,  4171200,  4484040,  4796880,  6053663,
                 15506632, 16669630, 17832627, 18995624],
                [       0,        0,        0,  4822800,  5184480,  5546160,
                  6993708, 16402500, 17632688, 18862875],
                [ 3031920,  3841443, 13041250, 14410581, 15779912, 14200000,
                 15691000, 17182000, 18673000, 15000000]])
```

In [4]: `Games`

```
Out[4]:  array([[80, 77, 82, 82, 73, 82, 58, 78,  6, 35],
                [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
                [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
                [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
                [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],
                [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],
                [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],
                [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
                [40, 40, 40, 81, 78, 81, 39,  0, 10, 51],
                [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

In [5]: `Points`

```
Out[5]:  array([[2832, 2430, 2323, 2201, 1970, 2078, 1616, 2133,   83,  782],
                [1653, 1426, 1779, 1688, 1619, 1312, 1129, 1170, 1245, 1154],
                [2478, 2132, 2250, 2304, 2258, 2111, 1683, 2036, 2089, 1743],
                [2122, 1881, 1978, 1504, 1943, 1970, 1245, 1920, 2112,  966],
                [1292, 1443, 1695, 1624, 1503, 1784, 1113, 1296, 1297,  646],
                [1572, 1561, 1496, 1746, 1678, 1438, 1025, 1232, 1281,  928],
                [1258, 1104, 1684, 1781,  841, 1268, 1189, 1186, 1185, 1564],
                [ 903,  903, 1624, 1871, 2472, 2161, 1850, 2280, 2593,  686],
                [ 597,  597,  597, 1361, 1619, 2026,  852,    0,  159,  904],
                [2040, 1397, 1254, 2386, 2045, 1941, 1082, 1463, 1028, 1331]])
```

In [6]:
```python
mydata=np.arange(0,20)
print(mydata)
```

```
[ 0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19]
```

In [7]: `np.reshape(mydata,(4,5))`

```
Out[7]:  array([[ 0,  1,  2,  3,  4],
                [ 5,  6,  7,  8,  9],
                [10, 11, 12, 13, 14],
                [15, 16, 17, 18, 19]])
```

In [8]: `mydata`

Out[8]: array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16,
               17, 18, 19])

In [9]:
```
mat1=np.reshape(mydata,(5,4), order='c')
mat1
```

Out[9]: array([[0, 1, 2, 3],
               [4, 5, 6, 7],
               [8, 9, 10, 11],
               [12, 13, 14, 15],
               [16, 17, 18, 19]])

In [10]:
```
mat1
```

Out[10]: array([[0, 1, 2, 3],
                [4, 5, 6, 7],
                [8, 9, 10, 11],
                [12, 13, 14, 15],
                [16, 17, 18, 19]])

In [11]:
```
mat1[4,3]
```

Out[11]: 19

In [12]:
```
mat1[3,3]
```

Out[12]: 15

In [13]:
```
mat1
```

Out[13]: array([[0, 1, 2, 3],
                [4, 5, 6, 7],
                [8, 9, 10, 11],
                [12, 13, 14, 15],
                [16, 17, 18, 19]])

In [14]:
```
mat1[-3,-1]
```

Out[14]: 11

In [15]:
```
mat1
```

Out[15]: array([[0, 1, 2, 3],
                [4, 5, 6, 7],
                [8, 9, 10, 11],
                [12, 13, 14, 15],
                [16, 17, 18, 19]])

In [16]:
```
mydata
```

Out[16]: array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16,
                17, 18, 19])

In [17]:
```
mat2=np.reshape(mydata,(5,4) ,order='F')
mat2
```

Out[17]:   array([[0, 5, 10, 15],
                    [1, 6, 11, 16],
                    [2, 7, 12, 17],
                    [3, 8, 13, 18],
                    [4, 9, 14, 19]])

In [18]:   mat2[
             4,3]

Out[18]:   19

In [19]:   mat2[0,2]

Out[19]:   10

In [20]:   mat2[0:2]

Out[20]:   array([[0, 5, 10, 15],
                    [1, 6, 11, 16]])

In [21]:   mat2

Out[21]:   array([[0, 5, 10, 15],
                    [1, 6, 11, 16],
                    [2, 7, 12, 17],
                    [3, 8, 13, 18],
                    [4, 9, 14, 19]])

In [22]:   mat2[1:2]

Out[22]:   array([[1, 6, 11, 16]])

In [23]:   mat2[1,2]

Out[23]:   11

In [24]:   mat2

Out[24]:   array([[0, 5, 10, 15],
                    [1, 6, 11, 16],
                    [2, 7, 12, 17],
                    [3, 8, 13, 18],
                    [4, 9, 14, 19]])

In [25]:   mat2[-3,-3]

Out[25]:   7

In [26]:   mat2

Out[26]:   array([[0, 5, 10, 15],
                    [1, 6, 11, 16],
                    [2, 7, 12, 17],
                    [3, 8, 13, 18],
                    [4, 9, 14, 19]])

In [27]:   mat2[0:3]

```
Out[27]:  array([[ 0,  5, 10, 15],
                 [ 1,  6, 11, 16],
                 [ 2,  7, 12, 17]])
```

```
In [28]:  mydata
```

```
Out[28]:  array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
                 17, 18, 19])
```

```
In [29]:  mat3=np.reshape(mydata,(5,4), order='A')
          mat3
```

```
Out[29]:  array([[ 0,  1,  2,  3],
                 [ 4,  5,  6,  7],
                 [ 8,  9, 10, 11],
                 [12, 13, 14, 15],
                 [16, 17, 18, 19]])
```

```
In [30]:  mat2
```

```
Out[30]:  array([[ 0,  5, 10, 15],
                 [ 1,  6, 11, 16],
                 [ 2,  7, 12, 17],
                 [ 3,  8, 13, 18],
                 [ 4,  9, 14, 19]])
```

```
In [31]:  mat1
```

```
Out[31]:  array([[ 0,  1,  2,  3],
                 [ 4,  5,  6,  7],
                 [ 8,  9, 10, 11],
                 [12, 13, 14, 15],
                 [16, 17, 18, 19]])
```

```
In [32]:  a1=['welcome','to','datascience']
          a2=['required','hard' , 'work' ]
          a3=[1,2,3]
```

```
In [33]:  [a1,a2,a3]
```

```
Out[33]:  [['welcome', 'to', 'datascience'], ['required', 'hard', 'work'], [1, 2, 3]]
```

```
In [34]:  np.array([a1,a2,a3])
```

```
Out[34]:  array([['welcome', 'to', 'datascience'],
                 ['required', 'hard', 'work'],
                 ['1', '2', '3']], dtype='<U11')
```

```
In [35]:  Games
```

```
Out[35]:  array([[80, 77, 82, 82, 73, 82, 58, 78,  6, 35],
                 [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
                 [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
                 [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
                 [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],
                 [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],
                 [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],
                 [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
                 [40, 40, 40, 81, 78, 81, 39,  0, 10, 51],
                 [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

```
In [36]:  Games[0]
```

```
Out[36]:  array([80, 77, 82, 82, 73, 82, 58, 78,  6, 35])
```

```
In [37]:  Games[5]
```

```
Out[37]:  array([70, 69, 67, 77, 70, 77, 57, 74, 79, 44])
```

```
In [38]:  Games[0:5]
```

```
Out[38]:  array([[80, 77, 82, 82, 73, 82, 58, 78,  6, 35],
                 [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
                 [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
                 [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
                 [82, 82, 82, 79, 82, 78, 54, 76, 71, 41]])
```

```
In [39]:  Games[0,5]
```

```
Out[39]:  82
```

```
In [40]:  Games[0,2]
```

```
Out[40]:  82
```

```
In [41]:  Games
```

```
Out[41]:  array([[80, 77, 82, 82, 73, 82, 58, 78,  6, 35],
                 [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
                 [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
                 [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
                 [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],
                 [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],
                 [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],
                 [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
                 [40, 40, 40, 81, 78, 81, 39,  0, 10, 51],
                 [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

```
In [42]:  Games[0:2]
```

```
Out[42]:  array([[80, 77, 82, 82, 73, 82, 58, 78,  6, 35],
                 [82, 57, 82, 79, 76, 72, 60, 72, 79, 80]])
```

```
In [43]:  Games[1:2]
```

```
Out[43]:  array([[82, 57, 82, 79, 76, 72, 60, 72, 79, 80]])
```

```
In [44]:  Games[2]
```

Out[44]:   array([79, 78, 75, 81, 76, 79, 62, 76, 77, 69])

In [45]:   Games

Out[45]:   array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],
                  [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
                  [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
                  [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
                  [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],
                  [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],
                  [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],
                  [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
                  [40, 40, 40, 81, 78, 81, 39, 0, 10, 51],
                  [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])

In [46]:   Games[2,8]

Out[46]:   77

In [47]:   Games

Out[47]:   array([[80, 77, 82, 82, 73, 82, 58, 78, 6, 35],
                  [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
                  [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
                  [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
                  [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],
                  [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],
                  [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],
                  [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
                  [40, 40, 40, 81, 78, 81, 39, 0, 10, 51],
                  [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])

In [48]:   Games[-3,-1]

Out[48]:   27

In [49]:   Games[-3:-1]

Out[49]:   array([[35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
                  [40, 40, 40, 81, 78, 81, 39, 0, 10, 51]])

In [50]:   Points

Out[50]:   array([[2832, 2430, 2323, 2201, 1970, 2078, 1616, 2133,   83, 782],
                  [1653, 1426, 1779, 1688, 1619, 1312, 1129, 1170, 1245, 1154],
                  [2478, 2132, 2250, 2304, 2258, 2111, 1683, 2036, 2089, 1743],
                  [2122, 1881, 1978, 1504, 1943, 1970, 1245, 1920, 2112, 966],
                  [1292, 1443, 1695, 1624, 1503, 1784, 1113, 1296, 1297, 646],
                  [1572, 1561, 1496, 1746, 1678, 1438, 1025, 1232, 1281, 928],
                  [1258, 1104, 1684, 1781, 841, 1268, 1189, 1186, 1185, 1564],
                  [903, 903, 1624, 1871, 2472, 2161, 1850, 2280, 2593, 686],
                  [597, 597, 597, 1361, 1619, 2026, 852,   0, 159, 904],
                  [2040, 1397, 1254, 2386, 2045, 1941, 1082, 1463, 1028, 1331]])

In [51]:   Points[0]

Out[51]:   array([2832, 2430, 2323, 2201, 1970, 2078, 1616, 2133,   83, 782])

```
In [52]:  Points[6,1]
```

```
Out[52]:  1104
```

```
In [53]:  Points[3:6]
```

```
Out[53]:  array([[2122, 1881, 1978, 1504, 1943, 1970, 1245, 1920, 2112,  966],
                 [1292, 1443, 1695, 1624, 1503, 1784, 1113, 1296, 1297,  646],
                 [1572, 1561, 1496, 1746, 1678, 1438, 1025, 1232, 1281,  928]])
```

```
In [54]:  Points
```

```
Out[54]:  array([[2832, 2430, 2323, 2201, 1970, 2078, 1616, 2133,   83,  782],
                 [1653, 1426, 1779, 1688, 1619, 1312, 1129, 1170, 1245, 1154],
                 [2478, 2132, 2250, 2304, 2258, 2111, 1683, 2036, 2089, 1743],
                 [2122, 1881, 1978, 1504, 1943, 1970, 1245, 1920, 2112,  966],
                 [1292, 1443, 1695, 1624, 1503, 1784, 1113, 1296, 1297,  646],
                 [1572, 1561, 1496, 1746, 1678, 1438, 1025, 1232, 1281,  928],
                 [1258, 1104, 1684, 1781,  841, 1268, 1189, 1186, 1185, 1564],
                 [ 903,  903, 1624, 1871, 2472, 2161, 1850, 2280, 2593,  686],
                 [ 597,  597,  597, 1361, 1619, 2026,  852,    0,  159,  904],
                 [2040, 1397, 1254, 2386, 2045, 1941, 1082, 1463, 1028, 1331]])
```

```
In [55]:  Points[-6,-1]
```

```
Out[55]:  646
```

```
In [57]:  dict1={'key':'val1', 'key2':'val2','key':'val3'}
```

```
In [58]:  dict1
```

```
Out[58]:  {'key': 'val3', 'key2': 'val2'}
```

```
In [59]:  dict1['key2']
```

```
Out[59]:  'val2'
```

```
In [61]:  dict2 = {'bang':2,'hyd':'we are hear', 'pune':True}
```

```
In [62]:  dict2
```

```
Out[62]:  {'bang': 2, 'hyd': 'we are hear', 'pune': True}
```

```
In [64]:  dict3 = {'Germany':'I have been here', 'France':2, 'Spain': True}
```

```
In [65]:  dict3
```

```
Out[65]:  {'Germany': 'I have been here', 'France': 2, 'Spain': True}
```

```
In [66]:  dict3['France']
```

```
Out[66]:  2
```

```
In [67]:  Games
```

```
Out[67]: array([[80, 77, 82, 82, 73, 82, 58, 78,  6, 35],
                [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
                [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
                [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
                [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],
                [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],
                [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],
                [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
                [40, 40, 40, 81, 78, 81, 39,  0, 10, 51],
                [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

In [68]: `Pdict`

```
Out[68]: {'Sachin': 0,
          'Rahul': 1,
          'Smith': 2,
          'Sami': 3,
          'Pollard': 4,
          'Morris': 5,
          'Samson': 6,
          'Dhoni': 7,
          'Kohli': 8,
          'Sky': 9}
```

In [70]: `Pdict['Sachin']`

Out[70]: 0

In [72]: `Games[0]`

```
Out[72]: array([80, 77, 82, 82, 73, 82, 58, 78,  6, 35])
```

In [73]: `Games`

```
Out[73]: array([[80, 77, 82, 82, 73, 82, 58, 78,  6, 35],
                [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
                [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
                [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
                [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],
                [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],
                [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],
                [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
                [40, 40, 40, 81, 78, 81, 39,  0, 10, 51],
                [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

In [74]: `Pdict['Rahul']`

Out[74]: 1

In [75]: `Games[1]`

```
Out[75]: array([82, 57, 82, 79, 76, 72, 60, 72, 79, 80])
```

In [ ]:

Games

```
In [76]:   Games[Pdict['Rahul']]
```

```
Out[76]:   array([82, 57, 82, 79, 76, 72, 60, 72, 79, 80])
```

```
In [77]:   Points
```

```
Out[77]:   array([[2832, 2430, 2323, 2201, 1970, 2078, 1616, 2133,   83,  782],
                  [1653, 1426, 1779, 1688, 1619, 1312, 1129, 1170, 1245, 1154],
                  [2478, 2132, 2250, 2304, 2258, 2111, 1683, 2036, 2089, 1743],
                  [2122, 1881, 1978, 1504, 1943, 1970, 1245, 1920, 2112,  966],
                  [1292, 1443, 1695, 1624, 1503, 1784, 1113, 1296, 1297,  646],
                  [1572, 1561, 1496, 1746, 1678, 1438, 1025, 1232, 1281,  928],
                  [1258, 1104, 1684, 1781,  841, 1268, 1189, 1186, 1185, 1564],
                  [ 903,  903, 1624, 1871, 2472, 2161, 1850, 2280, 2593,  686],
                  [ 597,  597,  597, 1361, 1619, 2026,  852,    0,  159,  904],
                  [2040, 1397, 1254, 2386, 2045, 1941, 1082, 1463, 1028, 1331]])
```

```
In [78]:   Salary
```

```
Out[78]:   array([[15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
                   25244493, 27849149, 30453805, 23500000],
                  [12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
                   18038573, 19752645, 21466718, 23180790],
                  [ 4621800,  5828090, 13041250, 14410581, 15779912, 14500000,
                   16022500, 17545000, 19067500, 20644400],
                  [ 3713640,  4694041, 13041250, 14410581, 15779912, 17149243,
                   18518574, 19450000, 22407474, 22458000],
                  [ 4493160,  4806720,  6061274, 13758000, 15202590, 16647180,
                   18091770, 19536360, 20513178, 21436271],
                  [ 3348000,  4235220, 12455000, 14410581, 15779912, 14500000,
                   16022500, 17545000, 19067500, 20644400],
                  [ 3144240,  3380160,  3615960,  4574189, 13520500, 14940153,
                   16359805, 17779458, 18668431, 20068563],
                  [       0,        0,  4171200,  4484040,  4796880,  6053663,
                   15506632, 16669630, 17832627, 18995624],
                  [       0,        0,        0,  4822800,  5184480,  5546160,
                    6993708, 16402500, 17632688, 18862875],
                  [ 3031920,  3841443, 13041250, 14410581, 15779912, 14200000,
                   15691000, 17182000, 18673000, 15000000]])
```

```
In [ ]:
```

```
In [79]:   Salary[2,4
           ]
```

```
Out[79]:   15779912
```

```
In [80]:   Salary
```

```
Out[80]: array([[15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
                 25244493, 27849149, 30453805, 23500000],
                [12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
                 18038573, 19752645, 21466718, 23180790],
                [ 4621800,  5828090, 13041250, 14410581, 15779912, 14500000,
                 16022500, 17545000, 19067500, 20644400],
                [ 3713640,  4694041, 13041250, 14410581, 15779912, 17149243,
                 18518574, 19450000, 22407474, 22458000],
                [ 4493160,  4806720,  6061274, 13758000, 15202590, 16647180,
                 18091770, 19536360, 20513178, 21436271],
                [ 3348000,  4235220, 12455000, 14410581, 15779912, 14500000,
                 16022500, 17545000, 19067500, 20644400],
                [ 3144240,  3380160,  3615960,  4574189, 13520500, 14940153,
                 16359805, 17779458, 18668431, 20068563],
                [       0,        0,  4171200,  4484040,  4796880,  6053663,
                 15506632, 16669630, 17832627, 18995624],
                [       0,        0,        0,  4822800,  5184480,  5546160,
                  6993708, 16402500, 17632688, 18862875],
                [ 3031920,  3841443, 13041250, 14410581, 15779912, 14200000,
                 15691000, 17182000, 18673000, 15000000]])
```

In [81]: `Salary[Pdict['Sky']][Sdict['2019']]`

Out[81]:   15000000

In [82]: `Salary`

```
Out[82]: array([[15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
                 25244493, 27849149, 30453805, 23500000],
                [12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
                 18038573, 19752645, 21466718, 23180790],
                [ 4621800,  5828090, 13041250, 14410581, 15779912, 14500000,
                 16022500, 17545000, 19067500, 20644400],
                [ 3713640,  4694041, 13041250, 14410581, 15779912, 17149243,
                 18518574, 19450000, 22407474, 22458000],
                [ 4493160,  4806720,  6061274, 13758000, 15202590, 16647180,
                 18091770, 19536360, 20513178, 21436271],
                [ 3348000,  4235220, 12455000, 14410581, 15779912, 14500000,
                 16022500, 17545000, 19067500, 20644400],
                [ 3144240,  3380160,  3615960,  4574189, 13520500, 14940153,
                 16359805, 17779458, 18668431, 20068563],
                [       0,        0,  4171200,  4484040,  4796880,  6053663,
                 15506632, 16669630, 17832627, 18995624],
                [       0,        0,        0,  4822800,  5184480,  5546160,
                  6993708, 16402500, 17632688, 18862875],
                [ 3031920,  3841443, 13041250, 14410581, 15779912, 14200000,
                 15691000, 17182000, 18673000, 15000000]])
```

In [83]: `Games`

```
Out[83]: array([[80, 77, 82, 82, 73, 82, 58, 78,  6, 35],
                [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
                [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
                [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
                [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],
                [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],
                [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],
                [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
                [40, 40, 40, 81, 78, 81, 39,  0, 10, 51],
                [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

In [85]: Salary/Games

C:\Users\hp\AppData\Local\Temp\ipykernel_6252\3709746658.py:1: RuntimeWarning: di
vide by zero encountered in divide
  Salary/Games

```
Out[85]: array([[ 199335.9375     ,  230113.63636364,  237690.54878049,
                  259298.7804878 ,  315539.38356164,  302515.24390244,
                  435249.87931034,  357040.37179487, 5075634.16666667,
                  671428.57142857],
                [ 146341.46341463,  223582.26315789,  164492.40243902,
                  180159.07594937,  197062.55263158,  226729.16666667,
                  300642.88333333,  274342.29166667,  271730.60759494,
                  289759.875     ],
                [  58503.79746835,   74719.1025641 ,  173883.33333333,
                  177908.40740741,  207630.42105263,  183544.30379747,
                  258427.41935484,  230855.26315789,  247629.87012987,
                  299194.20289855],
                [  46420.5        ,   72216.01538462,  169366.88311688,
                  218342.13636364,  228694.37681159,  222717.44155844,
                  336701.34545455,  290298.50746269,  291006.15584416,
                  561450.        ],
                [  54794.63414634,   58618.53658537,   73917.97560976,
                  174151.89873418,  185397.43902439,  213425.38461538,
                  335032.77777778,  257057.36842105,  288918.        ,
                  522835.87804878],
                [  47828.57142857,   61380.        ,  185895.52238806,
                  187150.4025974 ,  225427.31428571,  188311.68831169,
                  281096.49122807,  237094.59459459,  241360.75949367,
                  469190.90909091],
                [  40310.76923077,   52815.        ,   45199.5        ,
                   58643.44871795,  300455.55555556,  186751.9125     ,
                  272663.41666667,  253992.25714286,  301103.72580645,
                  244738.57317073],
                [      0.        ,       0.        ,   52140.        ,
                   60595.13513514,   58498.53658537,   77611.06410256,
                  234948.96969697,  205797.90123457,  220155.88888889,
                  703541.62962963],
                [      0.        ,       0.        ,       0.        ,
                   59540.74074074,   66467.69230769,   68471.11111111,
                  179325.84615385,              inf, 1763268.8        ,
                  369860.29411765],
                [  40425.6        ,   75322.41176471,  255710.78431373,
                  182412.41772152,  204933.92207792,  186842.10526316,
                  320224.48979592,  249014.49275362,  345796.2962963 ,
                  241935.48387097]])
```

In [86]: np.round(Salary/Games)
```

```
C:\Users\hp\AppData\Local\Temp\ipykernel_6252\3232172828.py:1: RuntimeWarning: di
vide by zero encountered in divide
  np.round(Salary/Games)
```

Out[86]:
```
array([[ 199336.,   230114.,   237691.,   259299.,   315539.,   302515.,
         435250.,   357040.,  5075634.,   671429.],
       [ 146341.,   223582.,   164492.,   180159.,   197063.,   226729.,
         300643.,   274342.,   271731.,   289760.],
       [  58504.,    74719.,   173883.,   177908.,   207630.,   183544.,
         258427.,   230855.,   247630.,   299194.],
       [  46420.,    72216.,   169367.,   218342.,   228694.,   222717.,
         336701.,   290299.,   291006.,   561450.],
       [  54795.,    58619.,    73918.,   174152.,   185397.,   213425.,
         335033.,   257057.,   288918.,   522836.],
       [  47829.,    61380.,   185896.,   187150.,   225427.,   188312.,
         281096.,   237095.,   241361.,   469191.],
       [  40311.,    52815.,    45200.,    58643.,   300456.,   186752.,
         272663.,   253992.,   301104.,   244739.],
       [      0.,        0.,    52140.,    60595.,    58499.,    77611.,
         234949.,   205798.,   220156.,   703542.],
       [      0.,        0.,        0.,    59541.,    66468.,    68471.,
         179326.,       inf,  1763269.,   369860.],
       [  40426.,    75322.,   255711.,   182412.,   204934.,   186842.,
         320224.,   249014.,   345796.,   241935.]])
```

In [ ]:

In [88]:
```python
import warnings
warnings.filterwarnings('ignore')
```

In [89]:
```python
import numpy as np
import matplotlib.pyplot as plt
```

In [91]:
```python
%matplotlib inline
```

In [92]:
```python
Salary
```

Out[92]:
```
array([[15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
        25244493, 27849149, 30453805, 23500000],
       [12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
        18038573, 19752645, 21466718, 23180790],
       [ 4621800,  5828090, 13041250, 14410581, 15779912, 14500000,
        16022500, 17545000, 19067500, 20644400],
       [ 3713640,  4694041, 13041250, 14410581, 15779912, 17149243,
        18518574, 19450000, 22407474, 22458000],
       [ 4493160,  4806720,  6061274, 13758000, 15202590, 16647180,
        18091770, 19536360, 20513178, 21436271],
       [ 3348000,  4235220, 12455000, 14410581, 15779912, 14500000,
        16022500, 17545000, 19067500, 20644400],
       [ 3144240,  3380160,  3615960,  4574189, 13520500, 14940153,
        16359805, 17779458, 18668431, 20068563],
       [       0,        0,  4171200,  4484040,  4796880,  6053663,
        15506632, 16669630, 17832627, 18995624],
       [       0,        0,        0,  4822800,  5184480,  5546160,
         6993708, 16402500, 17632688, 18862875],
       [ 3031920,  3841443, 13041250, 14410581, 15779912, 14200000,
        15691000, 17182000, 18673000, 15000000]])
```

In [93]:
```python
Salary[0]
```

Out[93]: array([15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
                 25244493, 27849149, 30453805, 23500000])

In [94]: plt.plot(Salary[0])

Out[94]: [<matplotlib.lines.Line2D at 0x160f1a7c080>]
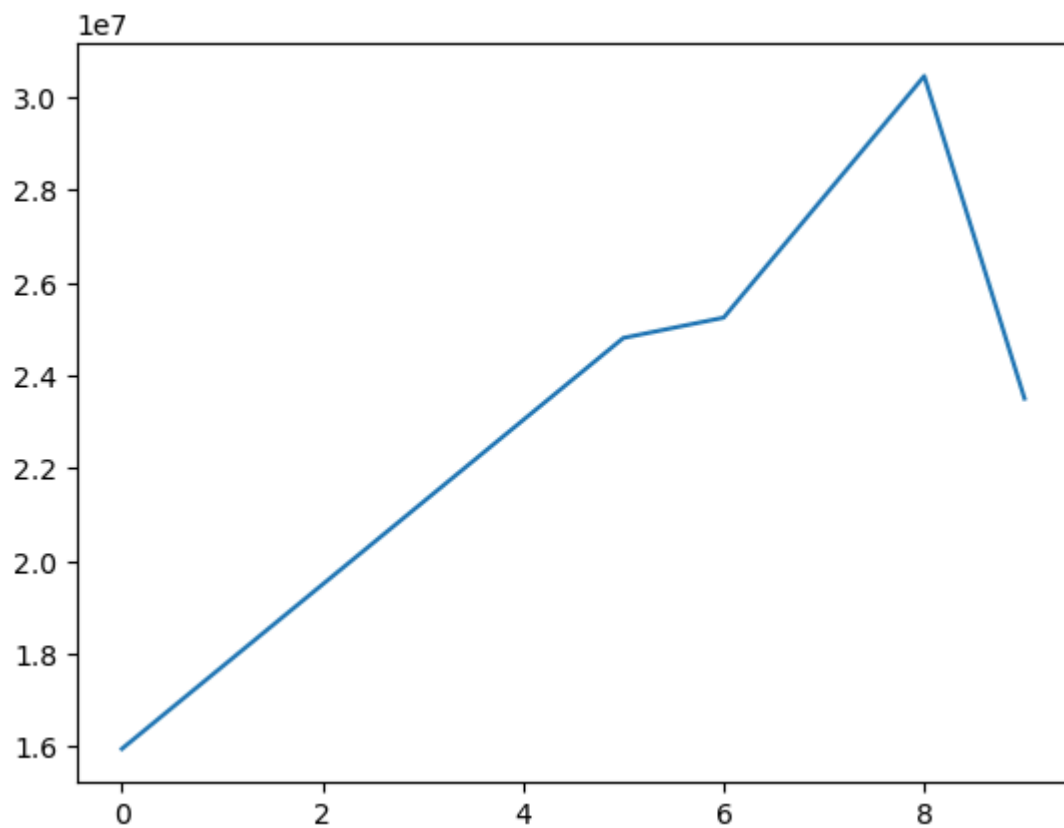
In [95]: plt.plot(Salary[0], c='red')

Out[95]: [<matplotlib.lines.Line2D at 0x160f1aa8a10>]
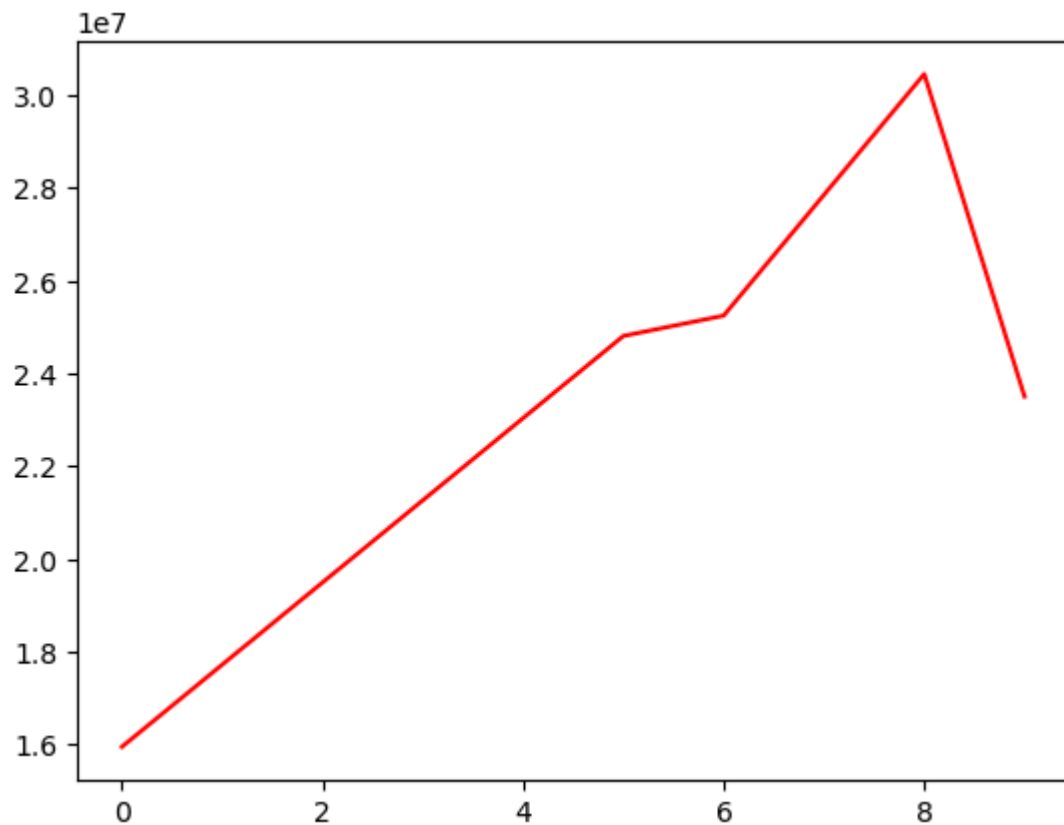
```
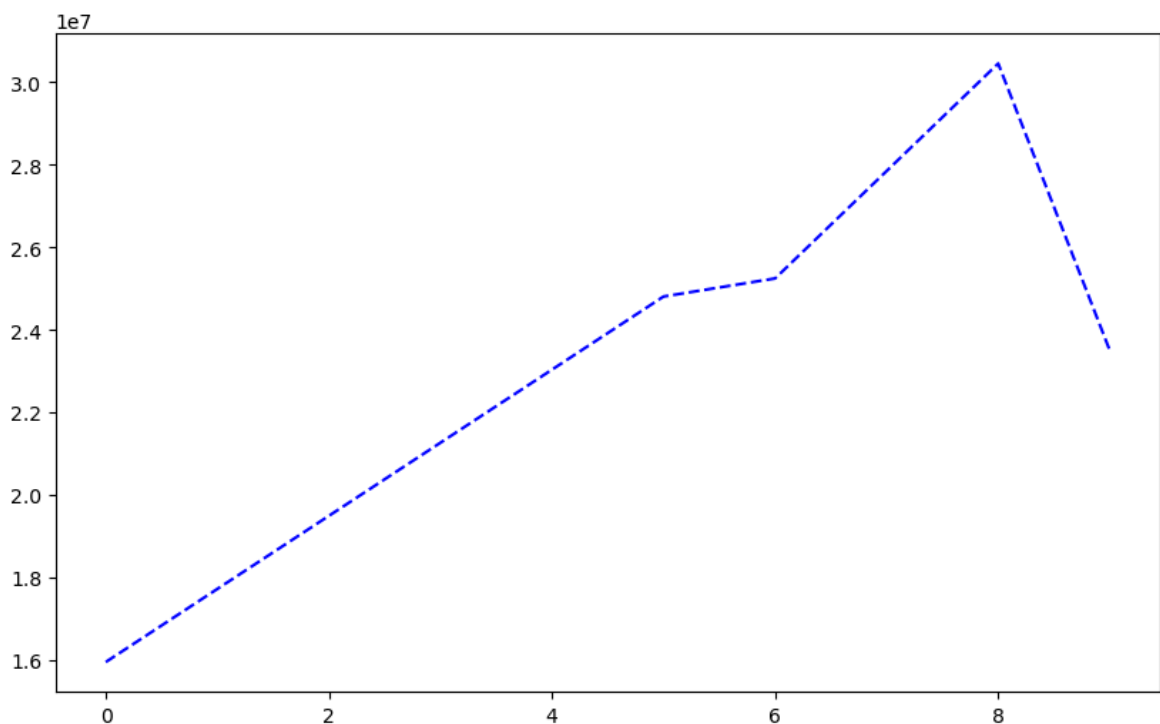In [96]:  %matplotlib inline
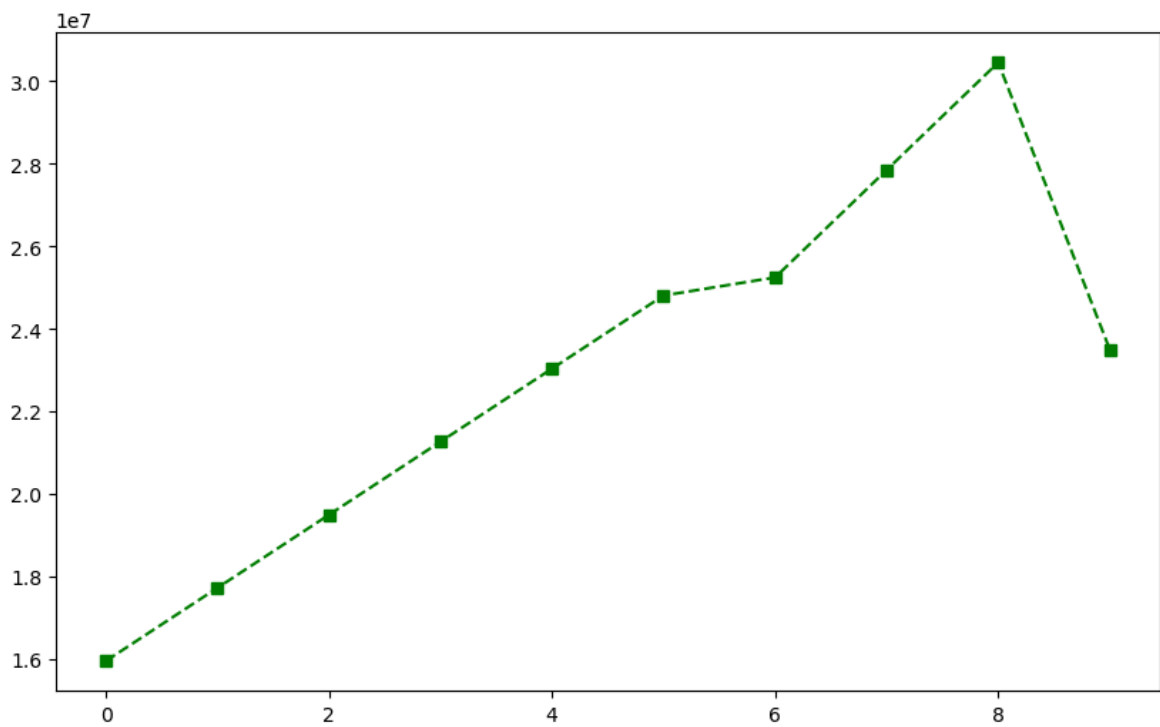          plt.rcParams['figure.figsize'] = 10,6
```

```
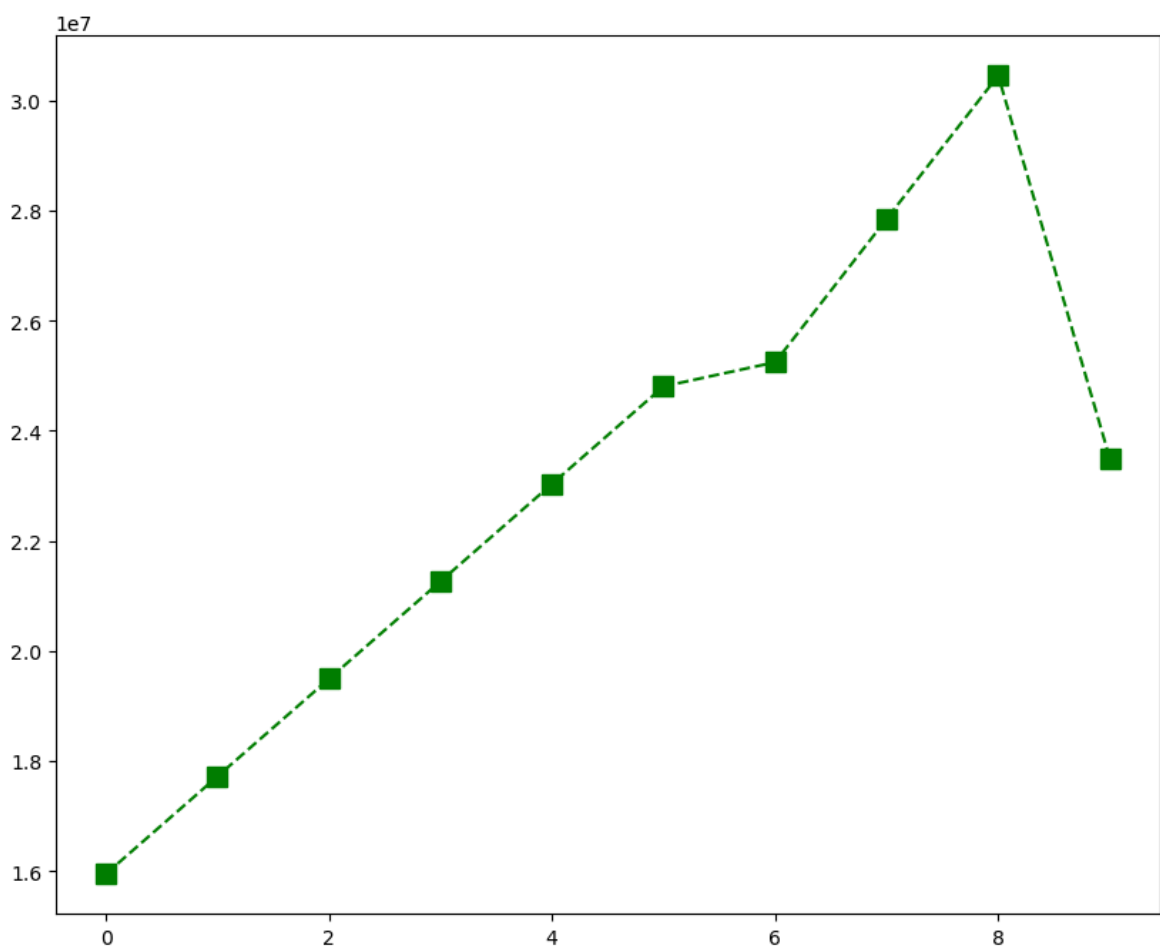In [97]:  plt.plot(Salary[0], c='Blue', ls='dashed')
```

Out[97]: [<matplotlib.lines.Line2D at 0x160f22b8a10>]


```
In [98]:  plt.plot(Salary[0], c='Green', ls = '--', marker = 's')
```

Out[98]: [<matplotlib.lines.Line2D at 0x160f1af8a70>]

In [99]:
```python
%matplotlib inline
plt.rcParams['figure.figsize'] = 10,8
```

In [100…
```python
plt.plot(Salary[0], c='Green', ls='--',marker='s',ms=10)
plt.show()
```


In [ ]:

In [101...   `list(range(0,10))`

Out[101...   `[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]`

In [102...   `Sdict`

Out[102...
```
{'2010': 0,
 '2011': 1,
 '2012': 2,
 '2013': 3,
 '2014': 4,
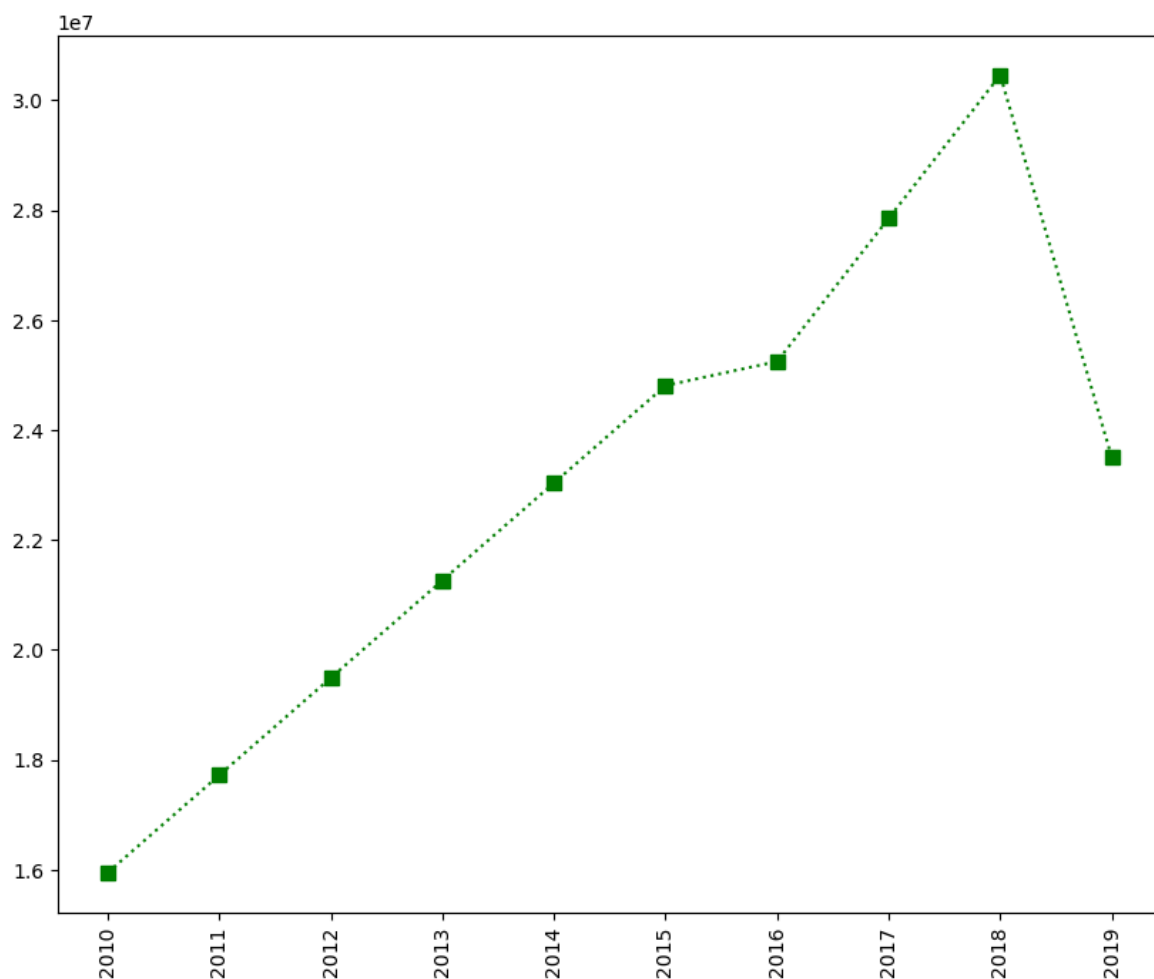 '2015': 5,
 '2016': 6,
 '2017': 7,
 '2018': 8,
 '2019': 9}
```

In [103...   `Pdict`

Out[103...
```
{'Sachin': 0,
 'Rahul': 1,
 'Smith': 2,
 'Sami': 3,
 'Pollard': 4,
 'Morris': 5,
 'Samson': 6,
 'Dhoni': 7,
 'Kohli': 8,
 'Sky': 9}
```

In [104...
```python
plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7)
plt.xticks(list(range(0,10)), Seasons)
plt.show()
```
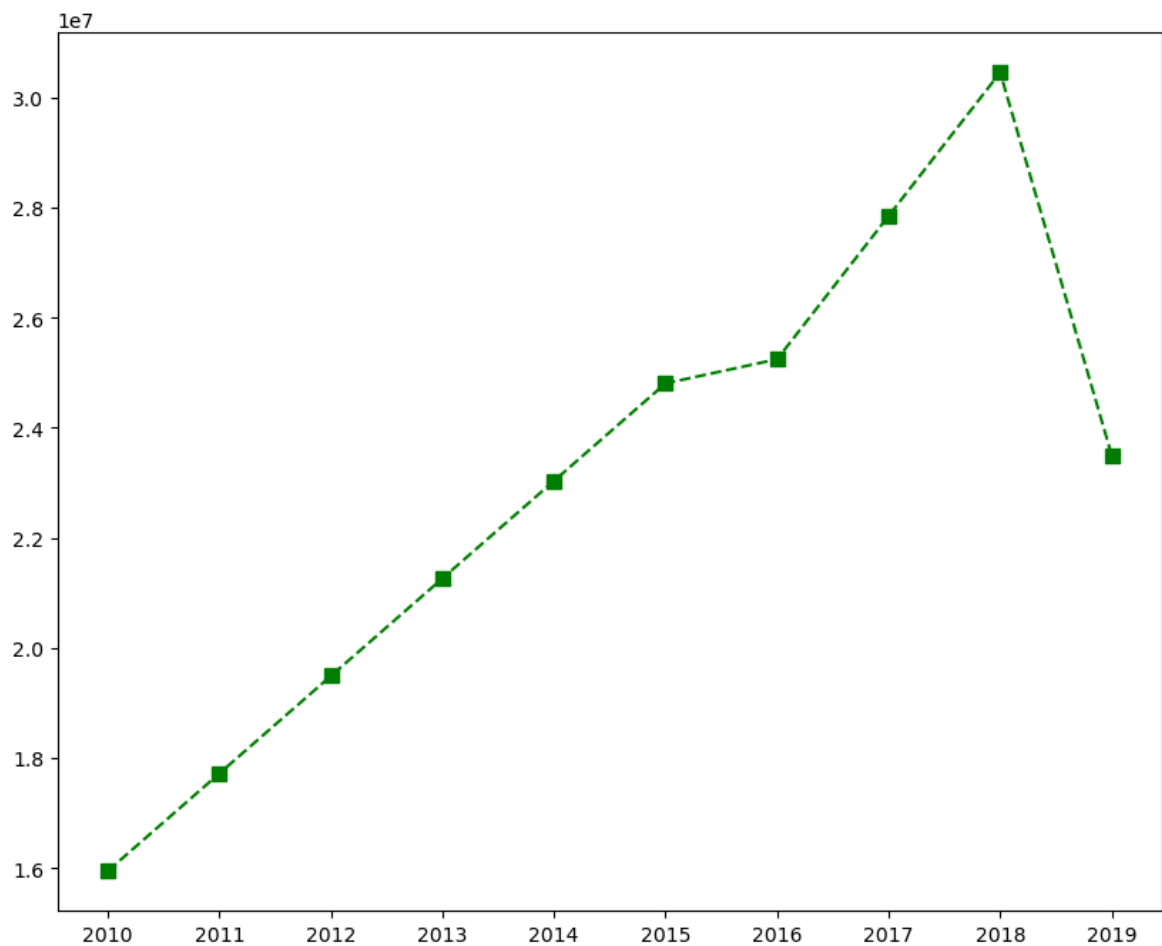
```
In [106…   plt.plot(Salary[0], c='Green', ls = ':', marker = 's', ms = 7, label = Players[0
           plt.xticks(list(range(0,10)), Seasons,rotation='vertical')
           plt.show()
```

```
In [ ]:
```

```
In [107…   Games
```

```
Out[107…   array([[80, 77, 82, 82, 73, 82, 58, 78,  6, 35],
                  [82, 57, 82, 79, 76, 72, 60, 72, 79, 80],
                  [79, 78, 75, 81, 76, 79, 62, 76, 77, 69],
                  [80, 65, 77, 66, 69, 77, 55, 67, 77, 40],
                  [82, 82, 82, 79, 82, 78, 54, 76, 71, 41],
                  [70, 69, 67, 77, 70, 77, 57, 74, 79, 44],
                  [78, 64, 80, 78, 45, 80, 60, 70, 62, 82],
                  [35, 35, 80, 74, 82, 78, 66, 81, 81, 27],
                  [40, 40, 40, 81, 78, 81, 39,  0, 10, 51],
                  [75, 51, 51, 79, 77, 76, 49, 69, 54, 62]])
```

```
In [108…   plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[
           plt.xticks(list(range(0,10)), Seasons,rotation='horizontal')
           plt.show()
```
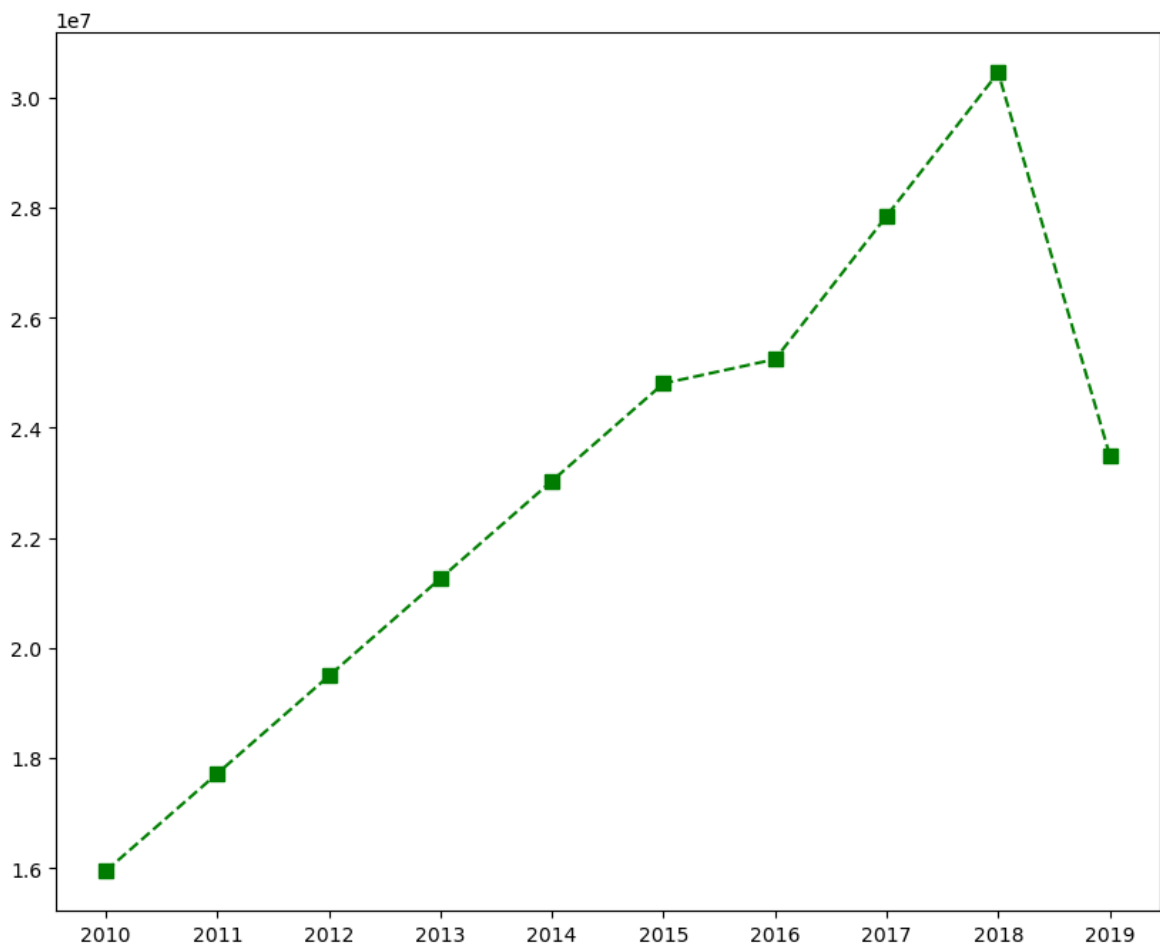
```
In [ ]:

In [109…   Salary

Out[109…   array([[15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
                   25244493, 27849149, 30453805, 23500000],
                  [12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
                   18038573, 19752645, 21466718, 23180790],
                  [ 4621800,  5828090, 13041250, 14410581, 15779912, 14500000,
                   16022500, 17545000, 19067500, 20644400],
                  [ 3713640,  4694041, 13041250, 14410581, 15779912, 17149243,
                   18518574, 19450000, 22407474, 22458000],
                  [ 4493160,  4806720,  6061274, 13758000, 15202590, 16647180,
                   18091770, 19536360, 20513178, 21436271],
                  [ 3348000,  4235220, 12455000, 14410581, 15779912, 14500000,
                   16022500, 17545000, 19067500, 20644400],
                  [ 3144240,  3380160,  3615960,  4574189, 13520500, 14940153,
                   16359805, 17779458, 18668431, 20068563],
                  [       0,        0,  4171200,  4484040,  4796880,  6053663,
                   15506632, 16669630, 17832627, 18995624],
                  [       0,        0,        0,  4822800,  5184480,  5546160,
                    6993708, 16402500, 17632688, 18862875],
                  [ 3031920,  3841443, 13041250, 14410581, 15779912, 14200000,
                   15691000, 17182000, 18673000, 15000000]])

In [110…   Salary[0]

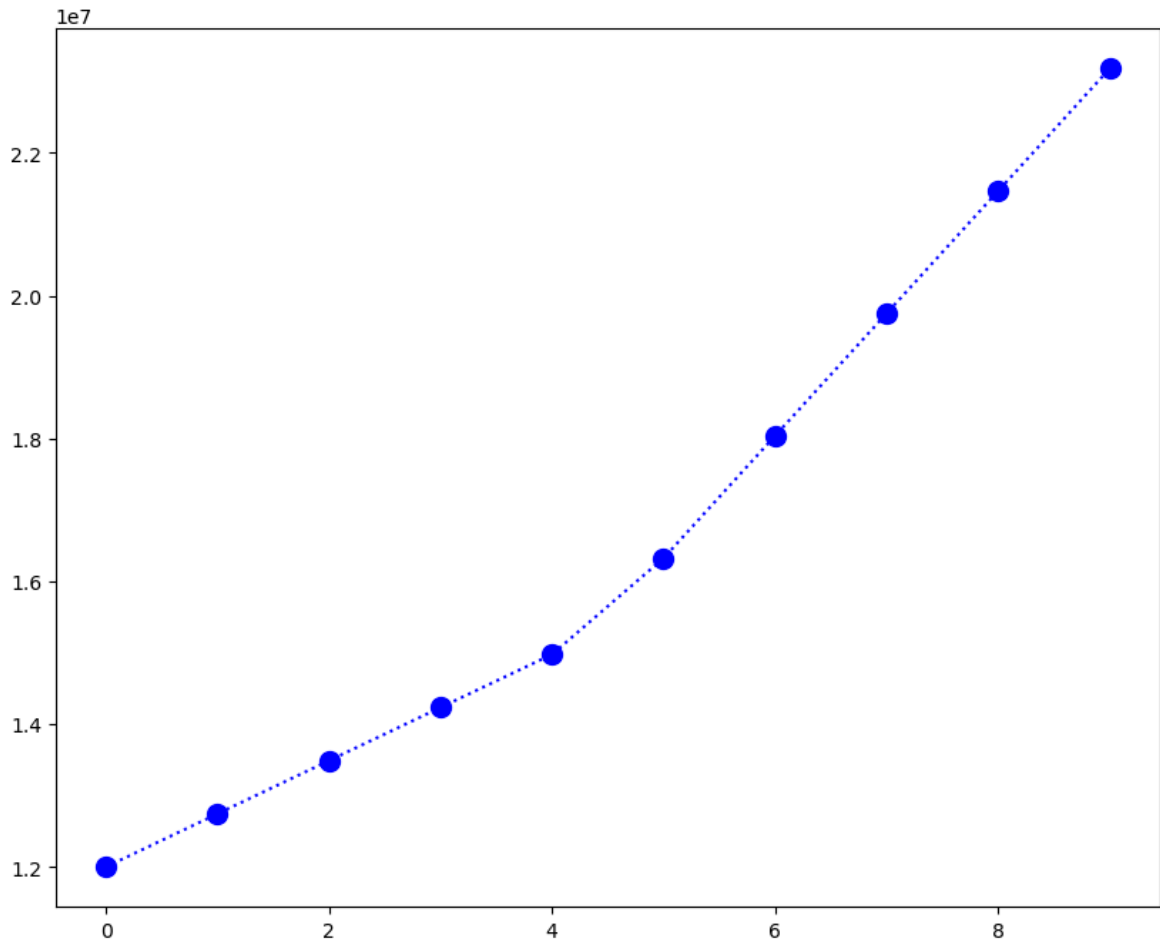Out[110…   array([15946875, 17718750, 19490625, 21262500, 23034375, 24806250,
                  25244493, 27849149, 30453805, 23500000])
```

In [111...   Salary[1]

Out[111...   array([12000000, 12744189, 13488377, 14232567, 14976754, 16324500,
                    18038573, 19752645, 21466718, 23180790])

In [113...   plt.plot(Salary[1], c='Blue', ls=':', marker='o', ms=10, label=Players[1])

Out[113...   [<matplotlib.lines.Line2D at 0x160f7e00a10>]

In [114...   ```
             plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 10, label = Players
             plt.plot(Salary[1], c='Blue', ls = ':', marker = 'o', ms = 10, label = Players[1

             plt.xticks(list(range(0,10)), Seasons,rotation='vertical')

             plt.show()
             ```
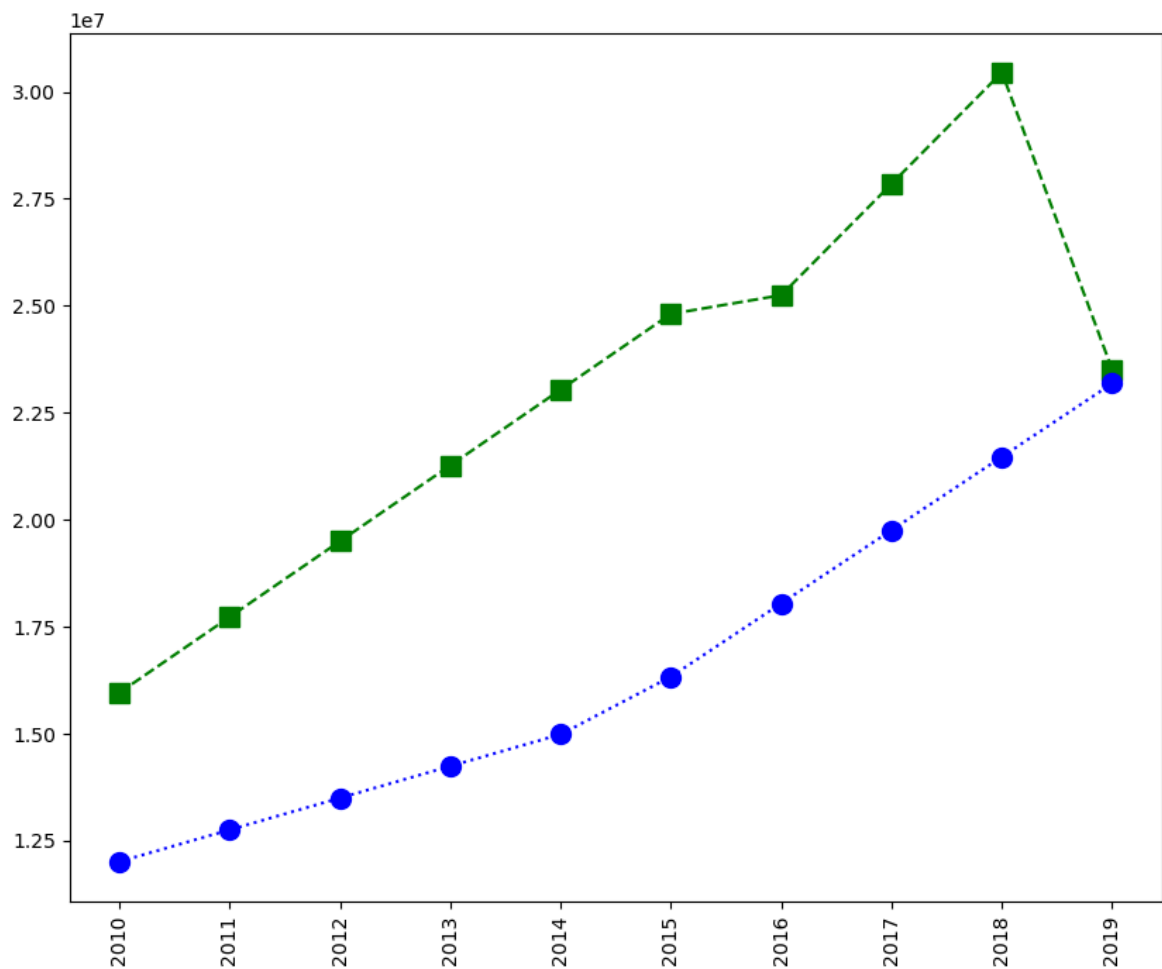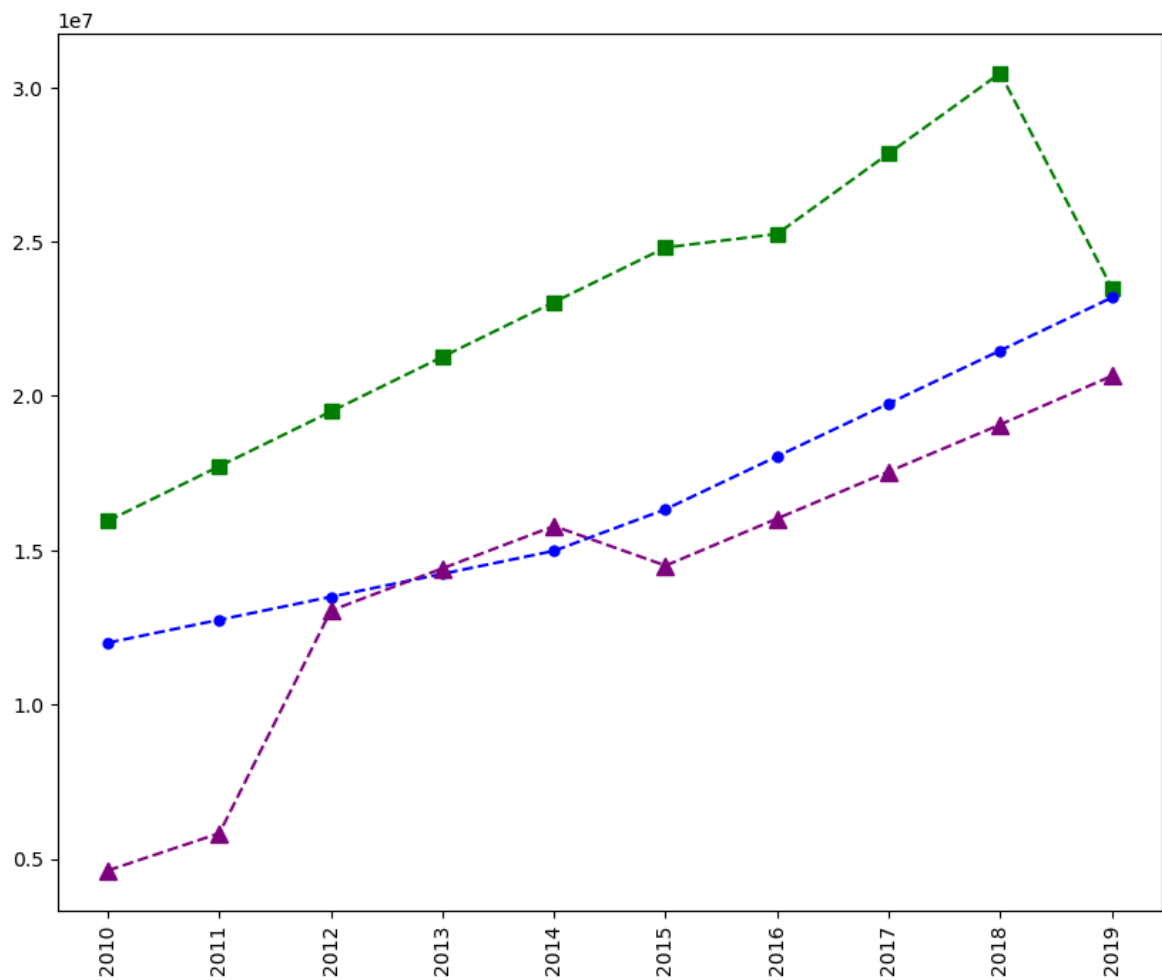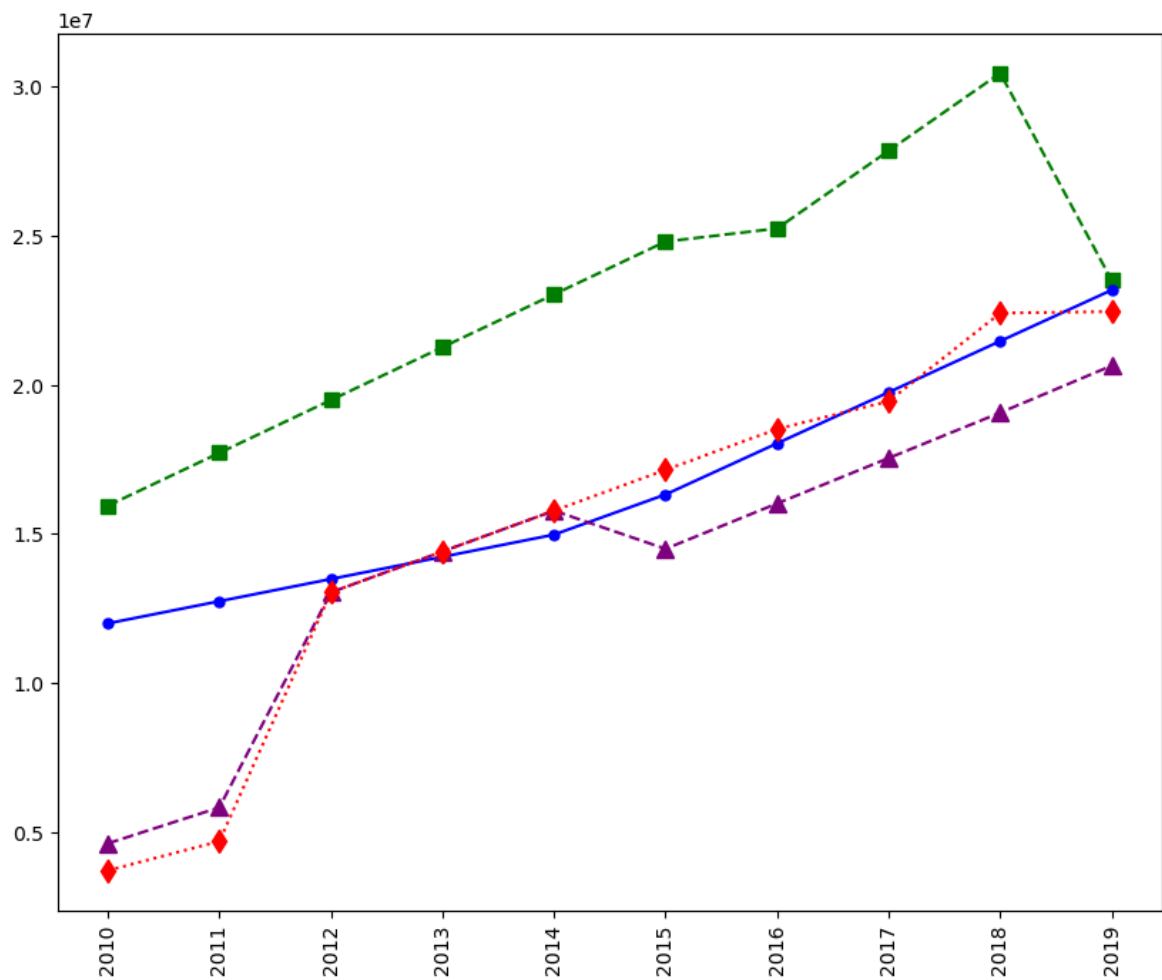
```
plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[
plt.plot(Salary[1], c='Blue', ls = '--', marker = 'o', ms = 5, label = Players[1
plt.plot(Salary[2], c='purple', ls = '--', marker = '^', ms = 8, label = Players

plt.xticks(list(range(0,10)), Seasons,rotation='vertical')

plt.show()
```

In [ ]:

In [116…

```python
plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[
plt.plot(Salary[1], c='Blue', ls = '-', marker = 'o', ms = 5, label = Players[1]
plt.plot(Salary[2], c='purple', ls = '--', marker = '^', ms = 8, label = Players
plt.plot(Salary[3], c='Red', ls = ':', marker = 'd', ms = 8, label = Players[3])

plt.xticks(list(range(0,10)), Seasons,rotation='vertical')

plt.show()
```
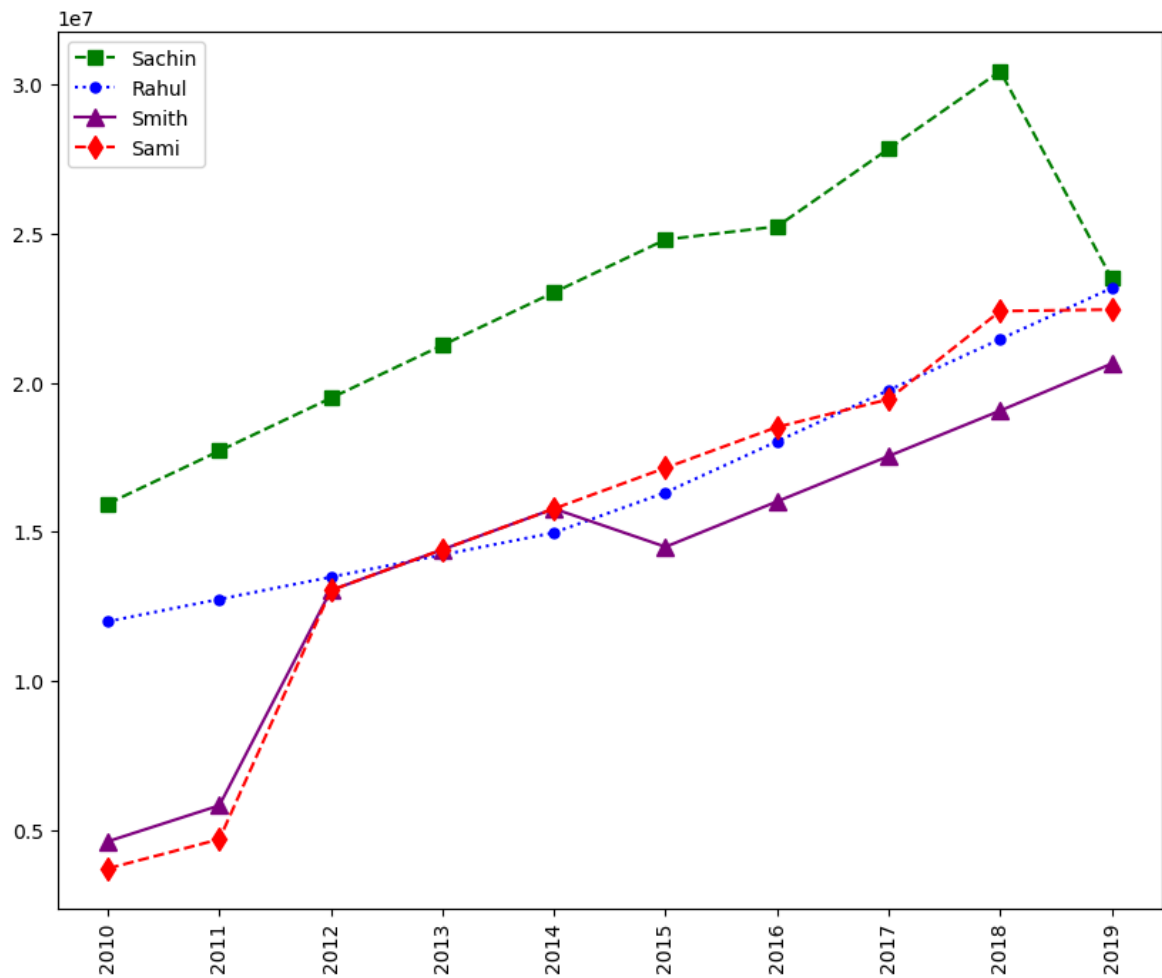
```
In [ ]:

In [117…   plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[
           plt.plot(Salary[1], c='Blue', ls = ':', marker = 'o', ms = 5, label = Players[1]
           plt.plot(Salary[2], c='purple', ls = '-', marker = '^', ms = 8, label = Players[
           plt.plot(Salary[3], c='Red', ls = '--', marker = 'd', ms = 8, label = Players[3]
           plt.legend()
           plt.xticks(list(range(0,10)), Seasons,rotation='vertical')

           plt.show()
```
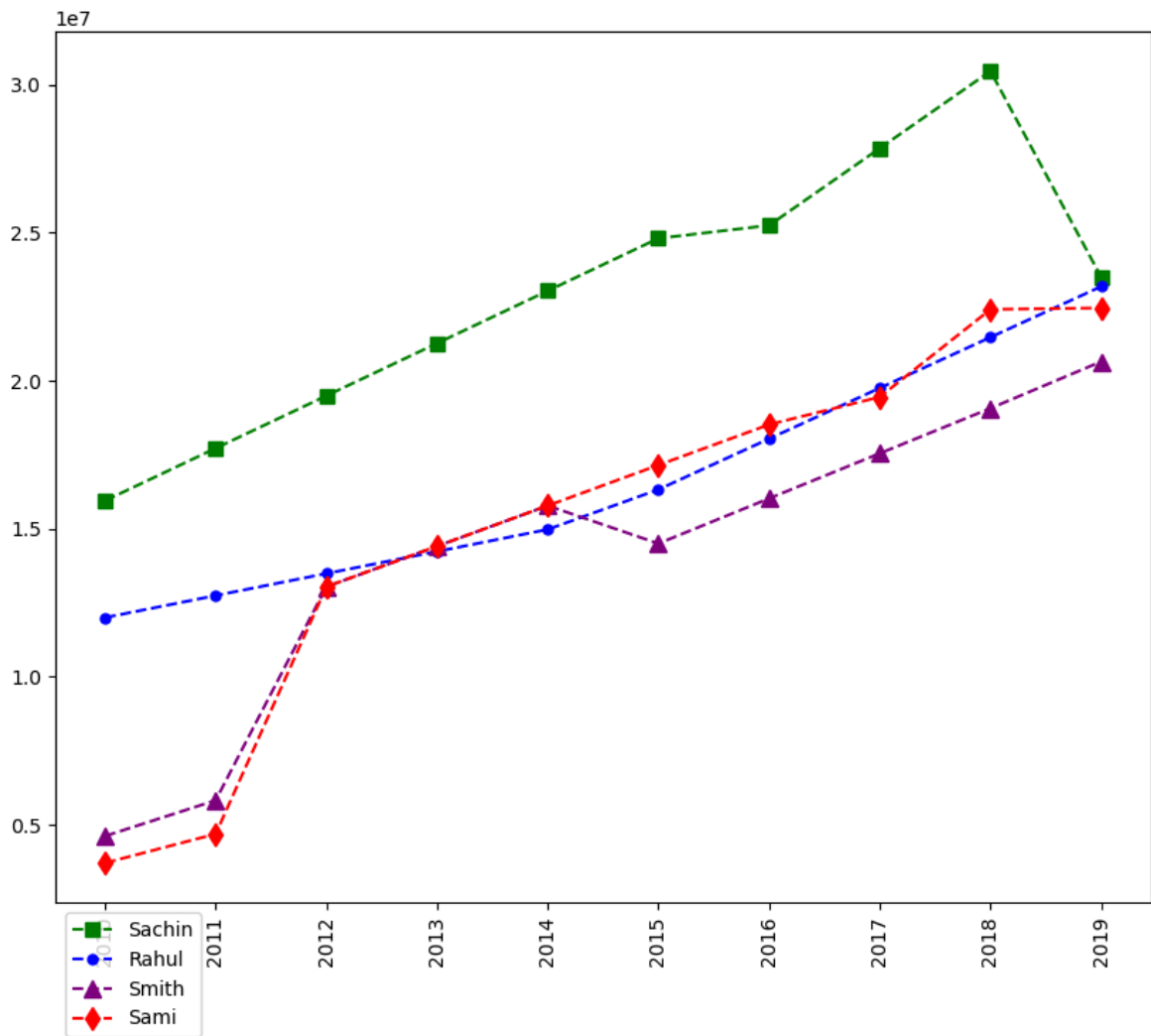
```
plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[
plt.plot(Salary[1], c='Blue', ls = '--', marker = 'o', ms = 5, label = Players[1
plt.plot(Salary[2], c='purple', ls = '--', marker = '^', ms = 8, label = Players
plt.plot(Salary[3], c='Red', ls = '--', marker = 'd', ms = 8, label = Players[3]
plt.legend(loc = 'upper left',bbox_to_anchor=(0,0) )
plt.xticks(list(range(0,10)), Seasons,rotation='vertical')

plt.show()
```
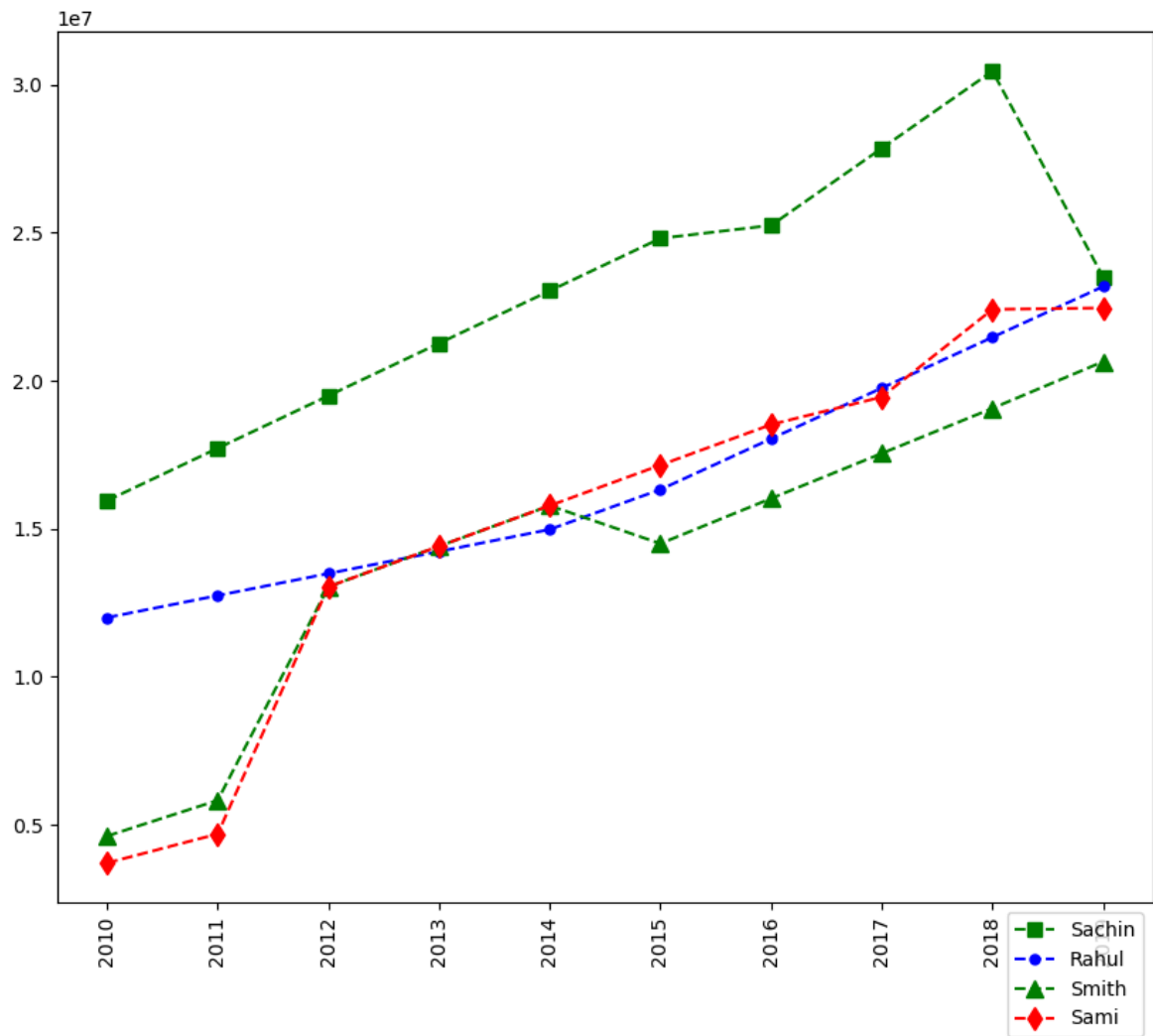
```
In [119…   plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[
           plt.plot(Salary[1], c='Blue', ls = '--', marker = 'o', ms = 5, label = Players[1
           plt.plot(Salary[2], c='Green', ls = '--', marker = '^', ms = 8, label = Players[
           plt.plot(Salary[3], c='Red', ls = '--', marker = 'd', ms = 8, label = Players[3]
           plt.legend(loc = 'upper right',bbox_to_anchor=(1,0) )
           plt.xticks(list(range(0,10)), Seasons,rotation='vertical')

           plt.show()
```
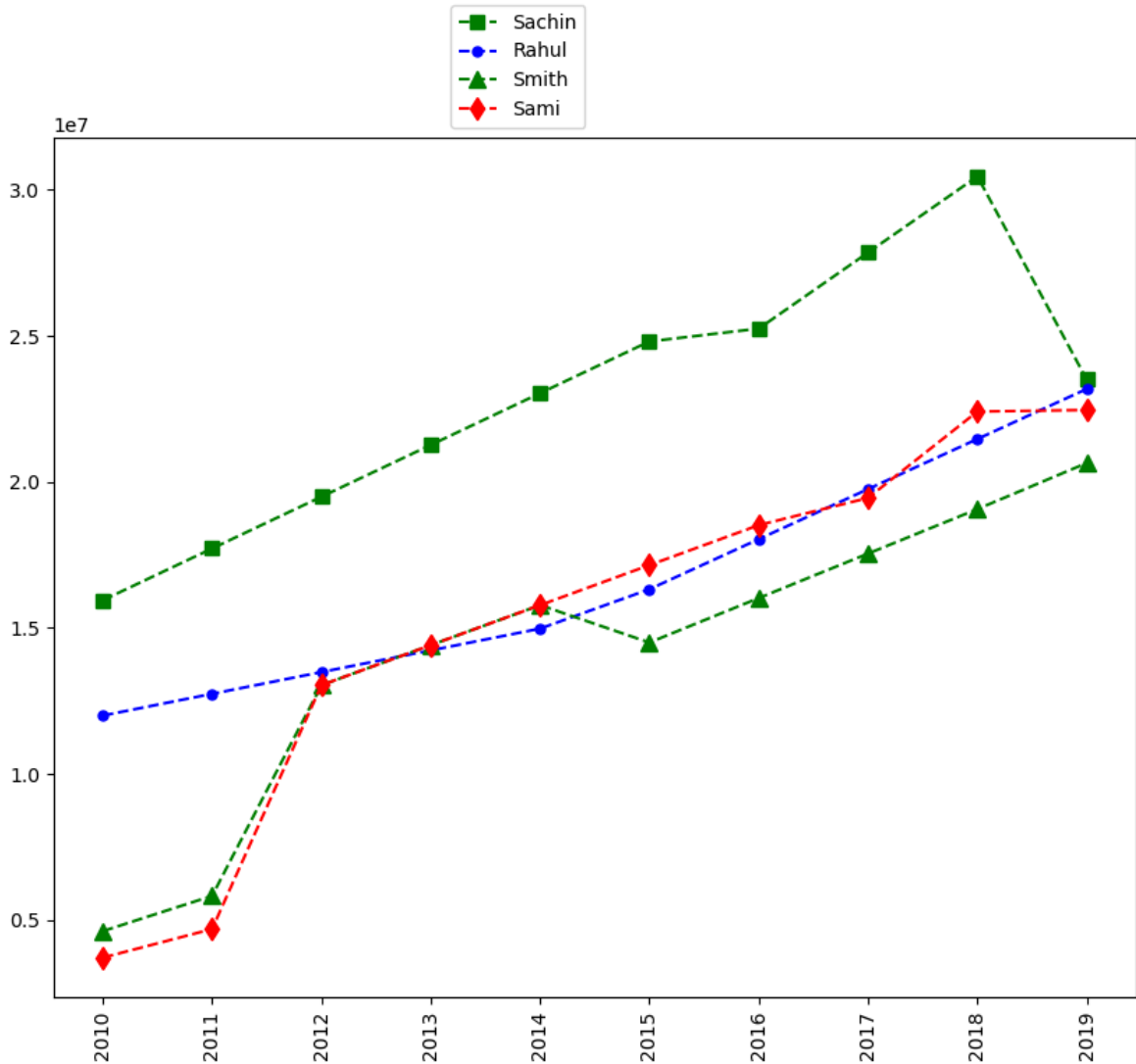
```
In [120…   plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[
           plt.plot(Salary[1], c='Blue', ls = '--', marker = 'o', ms = 5, label = Players[1
           plt.plot(Salary[2], c='Green', ls = '--', marker = '^', ms = 8, label = Players[
           plt.plot(Salary[3], c='Red', ls = '--', marker = 'd', ms = 8, label = Players[3]
           plt.legend(loc = 'lower right',bbox_to_anchor=(0.5,1) )
           plt.xticks(list(range(0,10)), Seasons,rotation='vertical')

           plt.show()
```

```python
plt.plot(Salary[0], c='Green', ls = '--', marker = 's', ms = 7, label = Players[
plt.plot(Salary[1], c='Blue', ls = '--', marker = 'o', ms = 7, label = Players[1
plt.plot(Salary[2], c='Green', ls = '--', marker = '^', ms = 7, label = Players[
plt.plot(Salary[3], c='Purple', ls = '--', marker = 'D', ms = 7, label = Players
plt.plot(Salary[4], c='Black', ls = '--', marker = 's', ms = 7, label = Players[
plt.plot(Salary[5], c='Red', ls = '--', marker = 'o', ms = 7, label = Players[5]
plt.plot(Salary[6], c='Red', ls = '--', marker = '^', ms = 7, label = Players[6]
plt.plot(Salary[7], c='Red', ls = '--', marker = 'd', ms = 7, label = Players[7]
plt.plot(Salary[8], c='Red', ls = '--', marker = 's', ms = 7, label = Players[8]
plt.plot(Salary[9], c='Red', ls = '--', marker = 'o', ms = 7, label = Players[9]

plt.legend(loc = 'lover right',bbox_to_anchor=(0.5,1) )
plt.xticks(list(range(0,10)), Seasons,rotation='vertical')

plt.show()
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
Cell In[122], line 12
      9 plt.plot(Salary[8], c='Red', ls = '--', marker = 's', ms = 7, label = Pla
yers[8])
     10 plt.plot(Salary[9], c='Red', ls = '--', marker = 'o', ms = 7, label = Pla
yers[9])
---> 12 plt.legend(loc = 'lover right',bbox_to_anchor=(0.5,1) )
     13 plt.xticks(list(range(0,10)), Seasons,rotation='vertical')
     15 plt.show()

File ~\anaconda3\Lib\site-packages\matplotlib\pyplot.py:3384, in legend(*args, **
kwargs)
   3382 @_copy_docstring_and_deprecators(Axes.legend)
   3383 def legend(*args, **kwargs) -> Legend:
-> 3384     return gca().legend(*args, **kwargs)

File ~\anaconda3\Lib\site-packages\matplotlib\axes\_axes.py:323, in Axes.legend(s
elf, *args, **kwargs)
    206 """
    207 Place a legend on the Axes.
    208
    (...)
    320 .. plot:: gallery/text_labels_and_annotations/legend.py
    321 """
    322 handles, labels, kwargs = mlegend._parse_legend_args([self], *args, **kwa
rgs)
--> 323 self.legend_ = mlegend.Legend(self, handles, labels, **kwargs)
    324 self.legend_._remove_method = self._remove_legend
    325 return self.legend_

File ~\anaconda3\Lib\site-packages\matplotlib\legend.py:566, in Legend.__init__(s
elf, parent, handles, labels, loc, numpoints, markerscale, markerfirst, reverse,
scatterpoints, scatteryoffsets, prop, fontsize, labelcolor, borderpad, labelspaci
ng, handlelength, handleheight, handletextpad, borderaxespad, columnspacing, ncol
s, mode, fancybox, shadow, title, title_fontsize, framealpha, edgecolor, facecolo
r, bbox_to_anchor, bbox_transform, frameon, handler_map, title_fontproperties, al
ignment, ncol, draggable)
    563 self._init_legend_box(handles, labels, markerfirst)
    565 # Set legend location
--> 566 self.set_loc(loc)
    568 # figure out title font properties:
    569 if title_fontsize is not None and title_fontproperties is not None:

File ~\anaconda3\Lib\site-packages\matplotlib\legend.py:687, in Legend.set_loc(se
lf, loc)
    685             loc = locs[0] + ' ' + locs[1]
    686     # check that loc is in acceptable strings
--> 687     loc = _api.check_getitem(self.codes, loc=loc)
    688 elif np.iterable(loc):
    689     # coerce iterable into tuple
    690     loc = tuple(loc)

File ~\anaconda3\Lib\site-packages\matplotlib\_api\__init__.py:183, in check_geti
tem(mapping, **kwargs)
    181     return mapping[v]
    182 except KeyError:
--> 183     raise ValueError(
    184         f"{v!r} is not a valid value for {k}; supported values are "
    185         f"{', '.join(map(repr, mapping))}") from None
```
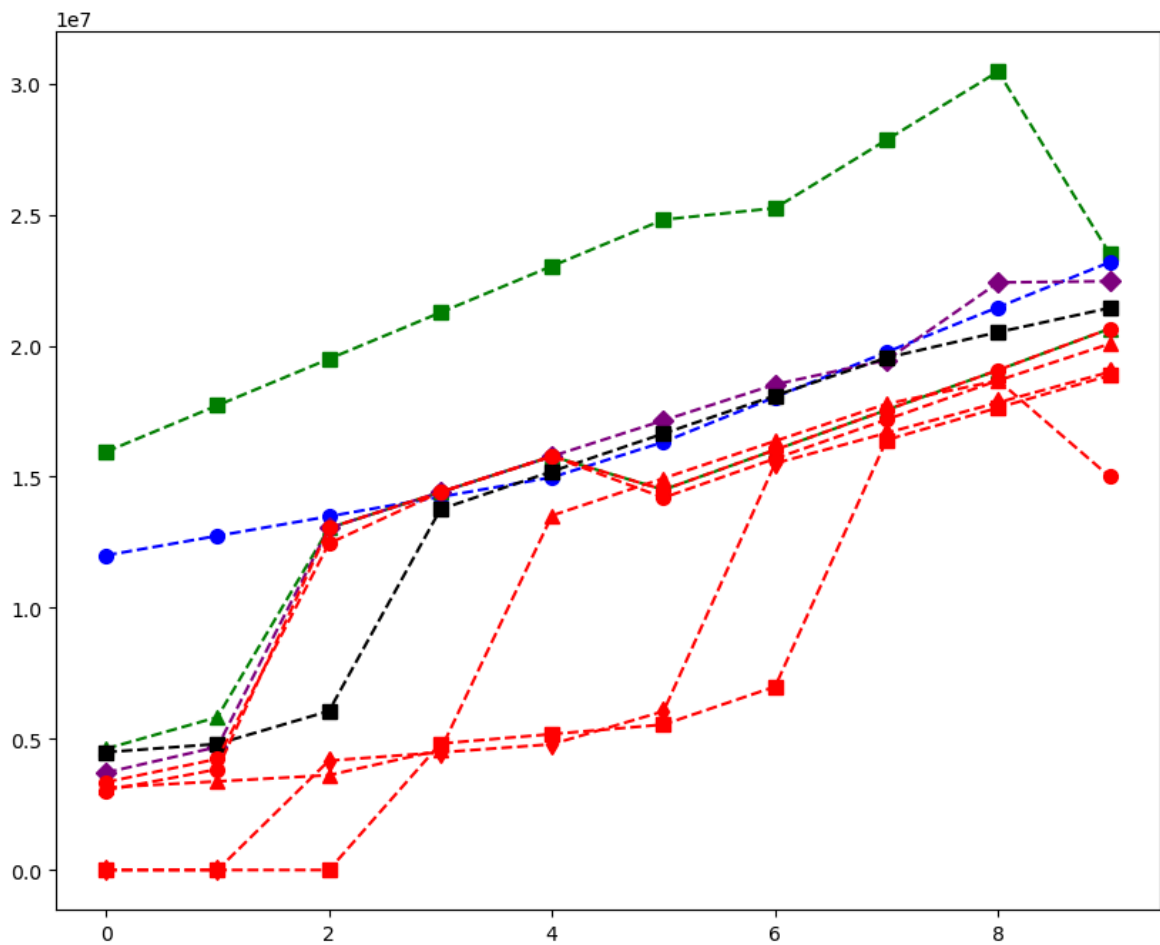
ValueError: 'lover right' is not a valid value for loc; supported values are 'bes
t', 'upper right', 'upper left', 'lower left', 'lower right', 'right', 'center le
ft', 'center right', 'lower center', 'upper center', 'center'

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]: