Section 4 Homework data

Dear Student,

Welcome to the dataset for the homework exercise.

Instructions for this dataset:

You have only been supplied vectors. You will need to create the matrices yourself.

Matrices:

- FreeThrows
- FreeThrowAttempts

Sincerely,

Kirill Eremenko

[Super Data Science (http://www.superdatascience.com)](http://www.superdatascience.com)

Copyright: These datasets were prepared using publicly available data. However, theses scripts are subject to Copyright Laws. If you wish to use these R scripts outside of the R Programming Course by Kirill Eremenko, you may do so by referencing [www.superdatascience.com (http://www.superdatascience.com)](http://www.superdatascience.com) in your work.

Comments: Seasons are labeled based on the first year in the season E.g. the 2012-2013 season is preseneted as simply 2012

Notes and Corrections to the data:

- Kevin Durant: 2006 - College Data Used
- Kevin Durant: 2005 - Proxied With 2006 Data
- Derrick Rose: 2012 - Did Not Play
- Derrick Rose: 2007 - College Data Used
- Derrick Rose: 2006 - Proxied With 2007 Data
- Derrick Rose: 2005 - Proxied With 2007 Data

In [14]:

```python
import numpy as np
import matplotlib.pyplot as plt
```

In [15]:

```python
 1   #Seasons
 2   Seasons = ["2005","2006","2007","2008","2009","2010","2011","2012","2013","2014"
 3   Sdict = {"2005":0,"2006":1,"2007":2,"2008":3,"2009":4,"2010":5,"2011":6,"2012":7
 4
 5   #Players
 6   Players = ["KobeBryant","JoeJohnson","LeBronJames","CarmeloAnthony","DwightHowar
 7   Pdict = {"KobeBryant":0,"JoeJohnson":1,"LeBronJames":2,"CarmeloAnthony":3,"Dwigh
 8
 9   #Games
10   KobeBryant_G = [80,77,82,82,73,82,58,78,6,35]
11   JoeJohnson_G = [82,57,82,79,76,72,60,72,79,80]
12   LeBronJames_G = [79,78,75,81,76,79,62,76,77,69]
13   CarmeloAnthony_G = [80,65,77,66,69,77,55,67,77,40]
14   DwightHoward_G = [82,82,82,79,82,78,54,76,71,41]
15   ChrisBosh_G = [70,69,67,77,70,77,57,74,79,44]
16   ChrisPaul_G = [78,64,80,78,45,80,60,70,62,82]
17   KevinDurant_G = [35,35,80,74,82,78,66,81,81,27]
18   DerrickRose_G = [40,40,40,81,78,81,39,0,10,51]
19   DwayneWade_G = [75,51,51,79,77,76,49,69,54,62]
20   #Matrix
21   Games = np.array([KobeBryant_G, JoeJohnson_G, LeBronJames_G, CarmeloAnthony_G, I
22
23   #Points
24   KobeBryant_PTS = [2832,2430,2323,2201,1970,2078,1616,2133,83,782]
25   JoeJohnson_PTS = [1653,1426,1779,1688,1619,1312,1129,1170,1245,1154]
26   LeBronJames_PTS = [2478,2132,2250,2304,2258,2111,1683,2036,2089,1743]
27   CarmeloAnthony_PTS = [2122,1881,1978,1504,1943,1970,1245,1920,2112,966]
28   DwightHoward_PTS = [1292,1443,1695,1624,1503,1784,1113,1296,1297,646]
29   ChrisBosh_PTS = [1572,1561,1496,1746,1678,1438,1025,1232,1281,928]
30   ChrisPaul_PTS = [1258,1104,1684,1781,841,1268,1189,1186,1185,1564]
31   KevinDurant_PTS = [903,903,1624,1871,2472,2161,1850,2280,2593,686]
32   DerrickRose_PTS = [597,597,597,1361,1619,2026,852,0,159,904]
33   DwayneWade_PTS = [2040,1397,1254,2386,2045,1941,1082,1463,1028,1331]
34   #Matrix
35   Points = np.array([KobeBryant_PTS, JoeJohnson_PTS, LeBronJames_PTS, CarmeloAntho
36
37
38   #Free Throws
39   KobeBryant_FT = [696,667,623,483,439,483,381,525,18,196]
40   JoeJohnson_FT = [261,235,316,299,220,195,158,132,159,141]
41   LeBronJames_FT = [601,489,549,594,593,503,387,403,439,375]
42   CarmeloAnthony_FT = [573,459,464,371,508,507,295,425,459,189]
43   DwightHoward_FT = [356,390,529,504,483,546,281,355,349,143]
44   ChrisBosh_FT = [474,463,472,504,470,384,229,241,223,179]
45   ChrisPaul_FT = [394,292,332,455,161,337,260,286,295,289]
46   KevinDurant_FT = [209,209,391,452,756,594,431,679,703,146]
47   DerrickRose_FT = [146,146,146,197,259,476,194,0,27,152]
48   DwayneWade_FT = [629,432,354,590,534,494,235,308,189,284]
49
50   #Matrix
51   #
52   # <put your code here>
53   #
54
55   #Free Throw Attempts
56   KobeBryant_FTA = [819,768,742,564,541,583,451,626,21,241]
57   JoeJohnson_FTA = [330,314,379,362,269,243,186,161,195,176]
58   LeBronJames_FTA = [814,701,771,762,773,663,502,535,585,528]
59   CarmeloAnthony_FTA = [709,568,590,468,612,605,367,512,541,237]
```

```
60  DwightHoward_FTA = [598,666,897,849,816,916,572,721,638,271]
61  ChrisBosh_FTA = [581,590,559,617,590,471,279,302,272,232]
62  ChrisPaul_FTA = [465,357,390,524,190,384,302,323,345,321]
63  KevinDurant_FTA = [256,256,448,524,840,675,501,750,805,171]
64  DerrickRose_FTA = [205,205,205,250,338,555,239,0,32,187]
65  DwayneWade_FTA = [803,535,467,771,702,652,297,425,258,370]
66
67  #Matrix
68  #
69  # <put your code here>
70
71
```

In [22]:

```
 1  # Define the individual player arrays
 2  KobeBryant_FTA = np.array([819, 768, 742, 564, 541, 583, 451, 626, 21, 241])
 3  JoeJohnson_FTA = np.array([330, 314, 379, 362, 269, 243, 186, 161, 195, 176])
 4  LeBronJames_FTA = np.array([814, 701, 771, 762, 773, 663, 502, 535, 585, 528])
 5  CarmeloAnthony_FTA = np.array([709, 568, 590, 468, 612, 605, 367, 512, 541, 237]
 6  DwightHoward_FTA = np.array([598, 666, 897, 849, 816, 916, 572, 721, 638, 271])
 7  ChrisBosh_FTA = np.array([581, 590, 559, 617, 590, 471, 279, 302, 272, 232])
 8  ChrisPaul_FTA = np.array([465, 357, 390, 524, 190, 384, 302, 323, 345, 321])
 9  KevinDurant_FTA = np.array([256, 256, 448, 524, 840, 675, 501, 750, 805, 171])
10  DerrickRose_FTA = np.array([205, 205, 205, 250, 338, 555, 239, 0, 32, 187])
11  DwayneWade_FTA = np.array([803, 535, 467, 771, 702, 652, 297, 425, 258, 370])
12
13  # Create the matrix
14  FreeThrowAttempts = np.array([KobeBryant_FTA, JoeJohnson_FTA, LeBronJames_FTA, C
15
16  # Transpose the matrix to have players as rows and seasons as columns
17  FreeThrowAttempts= FreeThrowAttempts.T
18
19  # Print the matrix
20  print(FreeThrowAttempts)
```

```
[[819 330 814 709 598 581 465 256 205 803]
 [768 314 701 568 666 590 357 256 205 535]
 [742 379 771 590 897 559 390 448 205 467]
 [564 362 762 468 849 617 524 524 250 771]
 [541 269 773 612 816 590 190 840 338 702]
 [583 243 663 605 916 471 384 675 555 652]
 [451 186 502 367 572 279 302 501 239 297]
 [626 161 535 512 721 302 323 750   0 425]
 [ 21 195 585 541 638 272 345 805  32 258]
 [241 176 528 237 271 232 321 171 187 370]]
```

In [23]:

```python
#Free Throws
KobeBryant_FT = [696,667,623,483,439,483,381,525,18,196]
JoeJohnson_FT = [261,235,316,299,220,195,158,132,159,141]
LeBronJames_FT = [601,489,549,594,593,503,387,403,439,375]
CarmeloAnthony_FT = [573,459,464,371,508,507,295,425,459,189]
DwightHoward_FT = [356,390,529,504,483,546,281,355,349,143]
ChrisBosh_FT = [474,463,472,504,470,384,229,241,223,179]
ChrisPaul_FT = [394,292,332,455,161,337,260,286,295,289]
KevinDurant_FT = [209,209,391,452,756,594,431,679,703,146]
DerrickRose_FT = [146,146,146,197,259,476,194,0,27,152]
DwayneWade_FT = [629,432,354,590,534,494,235,308,189,284]
# Create the matrix
FreeThrow = np.array([KobeBryant_FTA, JoeJohnson_FTA, LeBronJames_FTA, CarmeloAn

# Transpose the matrix to have players as rows and seasons as columns
FreeThrow= FreeThrow.T

# Print the matrix
print(FreeThrow)
```

```
[[819 330 814 709 598 581 465 256 205 803]
 [768 314 701 568 666 590 357 256 205 535]
 [742 379 771 590 897 559 390 448 205 467]
 [564 362 762 468 849 617 524 524 250 771]
 [541 269 773 612 816 590 190 840 338 702]
 [583 243 663 605 916 471 384 675 555 652]
 [451 186 502 367 572 279 302 501 239 297]
 [626 161 535 512 721 302 323 750   0 425]
 [ 21 195 585 541 638 272 345 805  32 258]
 [241 176 528 237 271 232 321 171 187 370]]
```

In [29]:

```python
#Seasons
Seasons = ["2005","2006","2007","2008","2009","2010","2011","2012","2013","2014"
Sdict = {"2005":0,"2006":1,"2007":2,"2008":3,"2009":4,"2010":5,"2011":6,"2012":7

#Players
Players = ["KobeBryant","JoeJohnson","LeBronJames","CarmeloAnthony","DwightHowar
Pdict = {"KobeBryant":0,"JoeJohnson":1,"LeBronJames":2,"CarmeloAnthony":3,"Dwigh
```

In [31]:

```python
Players = ["KobeBryant","JoeJohnson","LeBronJames","CarmeloAnthony","DwightHowar
Players
```
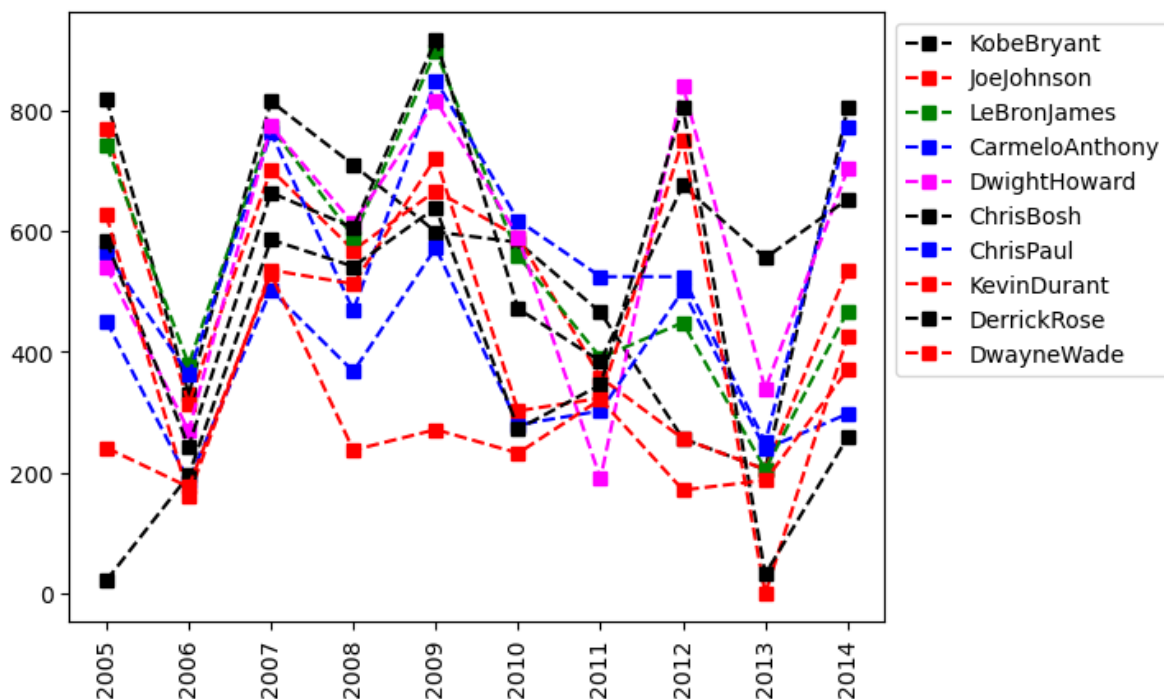
Out[31]:

```
['KobeBryant',
 'JoeJohnson',
 'LeBronJames',
 'CarmeloAnthony',
 'DwightHoward',
 'ChrisBosh',
 'ChrisPaul',
 'KevinDurant',
 'DerrickRose',
 'DwayneWade']
```

In [39]:

```python
# Universal function for any data, not only game
Players = ["KobeBryant","JoeJohnson","LeBronJames","CarmeloAnthony","DwightHowar

def myplot(data, playerlist=Players):
    col = {"KobeBryant":"Black","JoeJohnson":"Red","LeBronJames":"Green","Carmel

    for name in playerlist:
        plt.plot(data[Pdict[name]], c=col[name], ls="--", marker="s", label=name
    plt.xticks(list(range(0, 10)), Seasons, rotation="vertical")
    plt.legend(loc="upper left", bbox_to_anchor=(1, 1))
    plt.show()
```
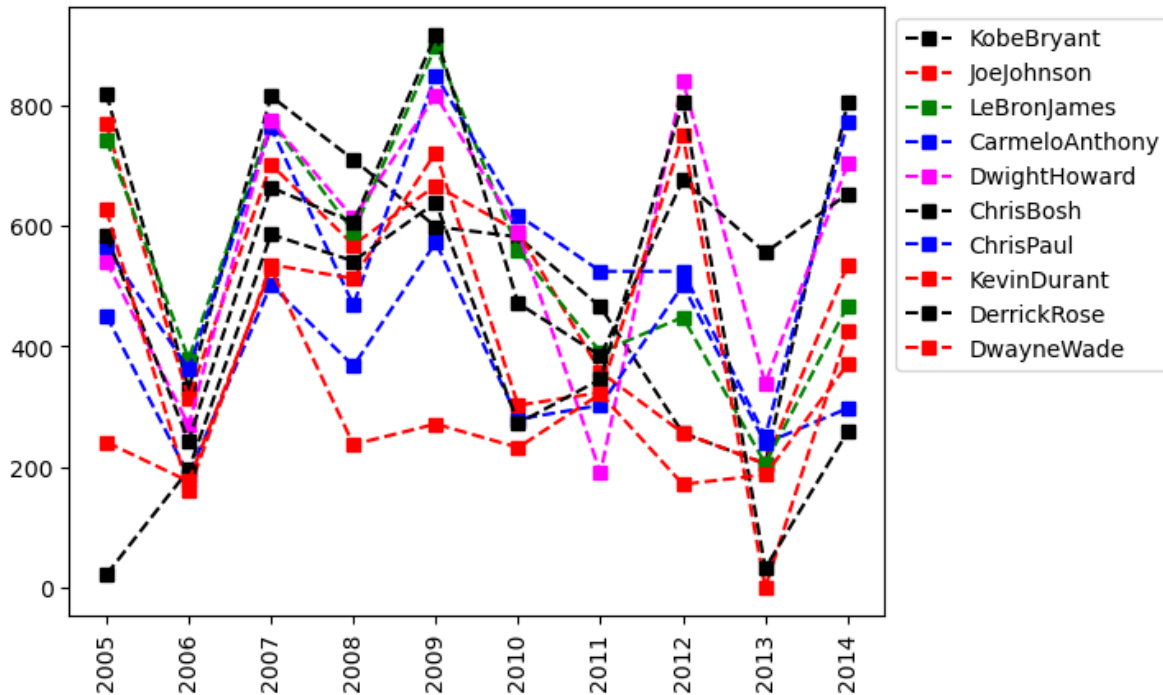
In [41]:

```python
myplot(FreeThrow)
```

In [43]:

```
1  myplot(FreeThrowAttempts)
```


In [44]:

```
1  #Games
2  KobeBryant_G = [80,77,82,82,73,82,58,78,6,35]
3  JoeJohnson_G = [82,57,82,79,76,72,60,72,79,80]
4  LeBronJames_G = [79,78,75,81,76,79,62,76,77,69]
5  CarmeloAnthony_G = [80,65,77,66,69,77,55,67,77,40]
6  DwightHoward_G = [82,82,82,79,82,78,54,76,71,41]
7  ChrisBosh_G = [70,69,67,77,70,77,57,74,79,44]
8  ChrisPaul_G = [78,64,80,78,45,80,60,70,62,82]
9  KevinDurant_G = [35,35,80,74,82,78,66,81,81,27]
10 DerrickRose_G = [40,40,40,81,78,81,39,0,10,51]
11 DwayneWade_G = [75,51,51,79,77,76,49,69,54,62]
12 #Matrix
13 Games = np.array([KobeBryant_G, JoeJohnson_G, LeBronJames_G, CarmeloAnthony_G, [
14 Games
```

Out[44]:

```
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 [45]:

```python
#frrethrow attempts per game
myplot(FreeThrowAttempts/Games)
```
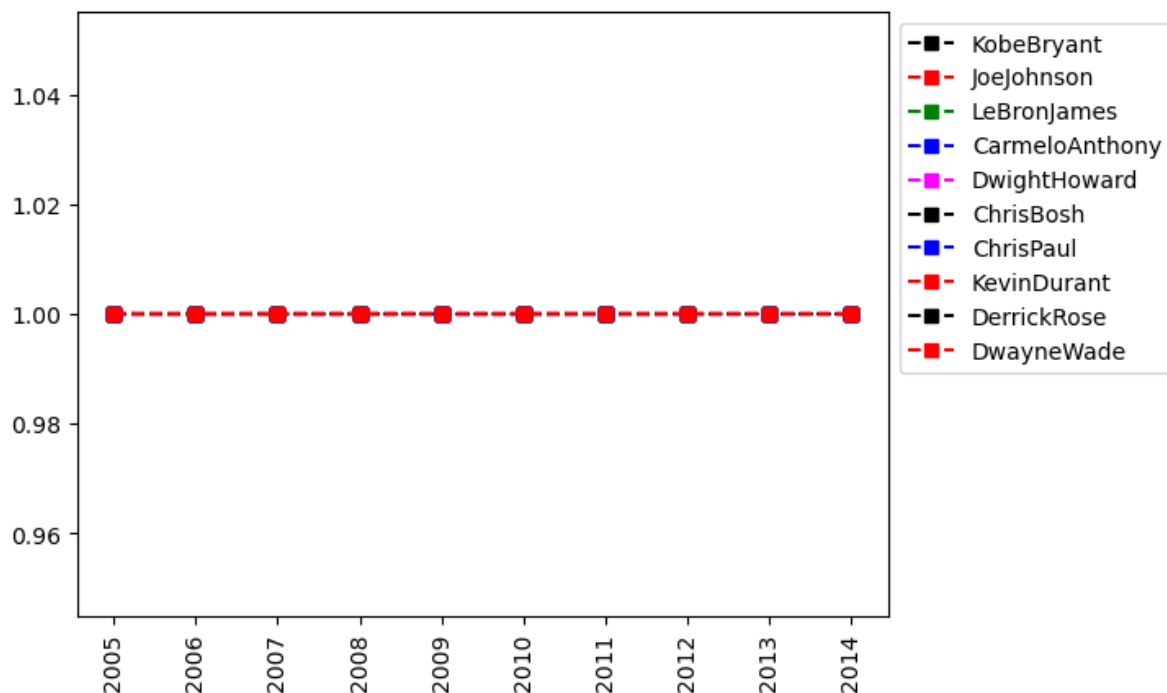
```
/var/folders/nn/vcmtyf8n1pl_gm88tw6nx6hw0000gn/T/ipykernel_63917/18899
99898.py:2: RuntimeWarning: divide by zero encountered in divide
  myplot(FreeThrowAttempts/Games)
```
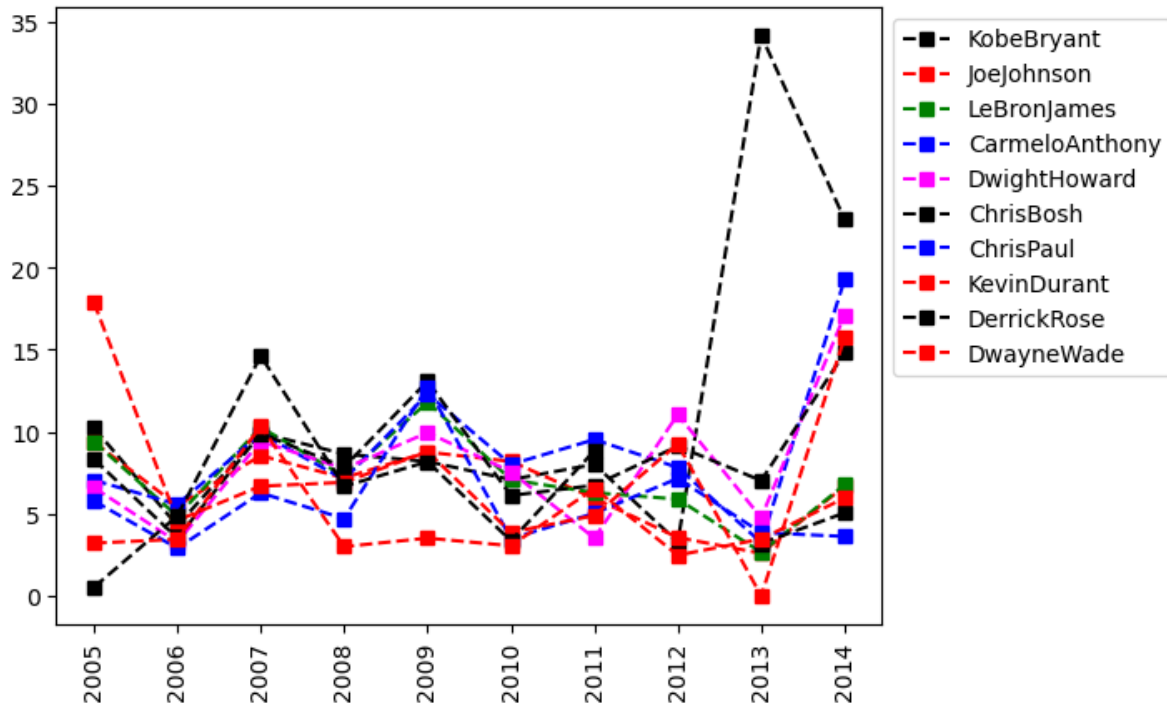

In [46]:

```python
#free throw accuracy
myplot(FreeThrow/FreeThrowAttempts)
```

```
/var/folders/nn/vcmtyf8n1pl_gm88tw6nx6hw0000gn/T/ipykernel_63917/41787
38744.py:1: RuntimeWarning: invalid value encountered in divide
  myplot(FreeThrow/FreeThrowAttempts)
```

In [47]:

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

Out[47]:

```
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 [48]:

```python
#Field Goals
KobeBryant_FG = [978,813,775,800,716,740,574,738,31,266]
JoeJohnson_FG = [632,536,647,620,635,514,423,445,462,446]
LeBronJames_FG = [875,772,794,789,768,758,621,765,767,624]
CarmeloAnthony_FG = [756,691,728,535,688,684,441,669,743,358]
DwightHoward_FG = [468,526,583,560,510,619,416,470,473,251]
ChrisBosh_FG = [549,543,507,615,600,524,393,485,492,343]
ChrisPaul_FG = [407,381,630,631,314,430,425,412,406,568]
KevinDurant_FG = [306,306,587,661,794,711,643,731,849,238]
DerrickRose_FG = [208,208,208,574,672,711,302,0,58,338]
DwayneWade_FG = [699,472,439,854,719,692,416,569,415,509]
#Matrix
FieldGoals  = np.array([KobeBryant_FG, JoeJohnson_FG, LeBronJames_FG, CarmeloAnt
FieldGoals
```
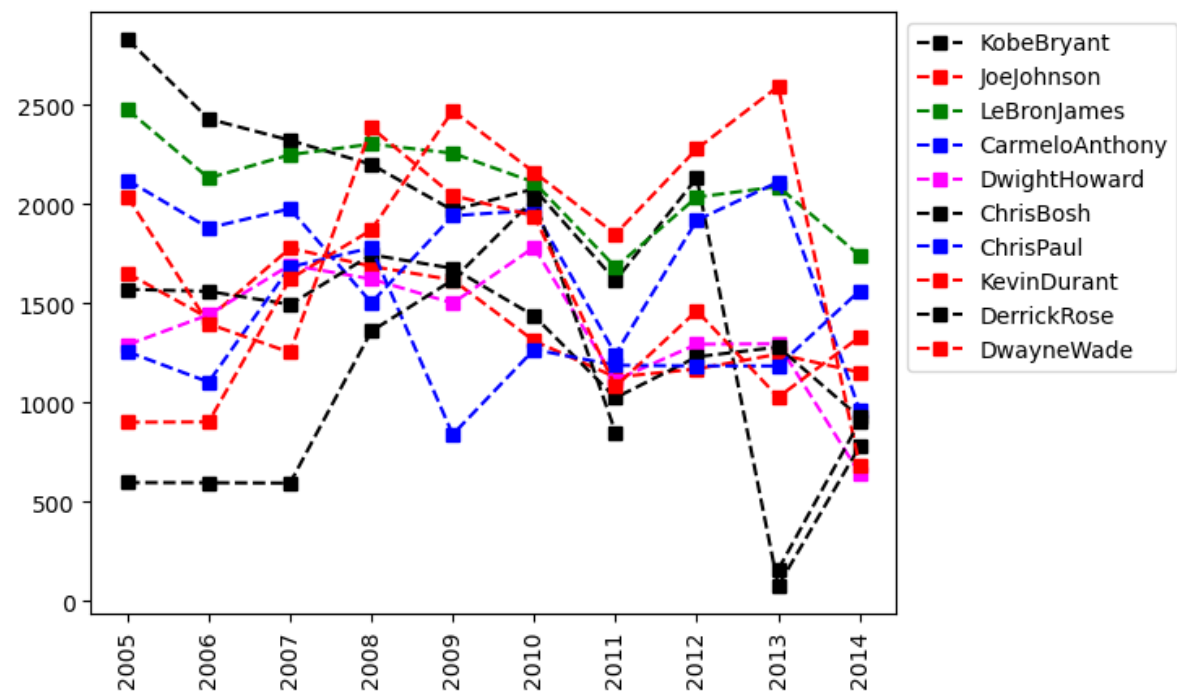
Out[48]:

```
array([[978, 813, 775, 800, 716, 740, 574, 738,  31, 266],
       [632, 536, 647, 620, 635, 514, 423, 445, 462, 446],
       [875, 772, 794, 789, 768, 758, 621, 765, 767, 624],
       [756, 691, 728, 535, 688, 684, 441, 669, 743, 358],
       [468, 526, 583, 560, 510, 619, 416, 470, 473, 251],
       [549, 543, 507, 615, 600, 524, 393, 485, 492, 343],
       [407, 381, 630, 631, 314, 430, 425, 412, 406, 568],
       [306, 306, 587, 661, 794, 711, 643, 731, 849, 238],
       [208, 208, 208, 574, 672, 711, 302,   0,  58, 338],
       [699, 472, 439, 854, 719, 692, 416, 569, 415, 509]])
```

In [49]:

```python
1  #player pattern excluding freethrow
2  myplot(Points-FreeThrow/FieldGoals)
```

/var/folders/nn/vcmtyf8n1pl_gm88tw6nx6hw0000gn/T/ipykernel_63917/33375
53298.py:2: RuntimeWarning: divide by zero encountered in divide
  myplot(Points-FreeThrow/FieldGoals)

In [ ]:

```python
1
```