```
import numpy as np # for mathematical caluclations
import pandas as pd
from datetime import datetime  # to access datetime
import scipy.stats as stats

# for data visualization
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px # for interactive plotting
import plotly.graph_objects as go # for interactive plotting

# set the plot style in matplotlib to ggplot and the firgure size to
15x5## Augmented Dickey Fuller Test for Assessing Stationarity
plt.style.use('ggplot')
plt.rcParams["figure.figsize"] = (15,5)

# for ingnoring warnings
import warnings # to ignore warning
warnings.filterwarnings('ignore')

#to show all columns
pd.set_option('display.max_columns', None)

#import data
player_data=pd.read_excel('NBA Per Game Cleaned Stats.xlsx')

#check null data
player_data[player_data.isna().any(axis=1)]
```

	Rk	Player-additional	Player	Pos	Age	Tm	G	GS	MPG
14	15	arcidry01	Ryan Arcidiacono	PG	28	POR	20	4	8.6
17	18	azubuud01	Udoka Azubuike	C	23	UTA	36	4	10.0
42	43	biyombi01	Bismack Biyombo	C	30	PHO	61	14	14.3
47	48	bolmale01	Leandro Bolmaro	SF	22	UTA	14	0	4.9
65	66	brownmo01	Moses Brown	C	23	BRK	36	1	8.2
66	67	brownst02	Sterling Brown	SF	27	LAL	4	0	6.0
72	73	burtode02	Deonte Burton	PF	29	SAC	2	0	3.0
73	74	butleja02	Jared Butler	PG	22	OKC	6	1	12.8
81	82	careyve01	Vernon Carey Jr.	C	21	WAS	11	0	2.5
87	88	champju01	Justin Champagnie	SF	21	BOS	5	0	

```
6.8
97    98          comanch01     Chance Comanche   C   26  POR   1   0
21.0
125  126          dorsety01        Tyler Dorsey  SF   26  DAL   3   0
2.7
128  129          dotsode01        Devon Dotson  PG   23  WAS   6   0
8.8
130  131          doziepj01           PJ Dozier  SF   26  SAC  16   0
4.9
150  151          fostemi02  Michael Foster Jr.  PF   20  PHI   1   0
1.0
155  156          gaffoda01      Daniel Gafford   C   24  WAS  78  47
20.6
165  166          gilyaja01       Jacob Gilyard  PG   24  MEM   1   0
41.0
211  212           hillma01        Malcolm Hill  SF   27  CHI   5   0
1.8
232  233          jacksfr01       Frank Jackson  PG   24  UTA   1   0
5.0
262  263          keelstr01        Trevor Keels  SG   19  NYK   3   0
2.7
265  266            keybr01         Braxton Key  SF   25  DET   3   0
3.0
340  341          monekch01        Chima Moneke  SF   27  SAC   2   0
4.0
343  344           moonxa01         Xavier Moon  SG   28  LAC   4   0
5.0
384  385          plumlma01       Mason Plumlee   C   32  LAC  79  60
26.0
393  394          pottemi01        Micah Potter  PF   24  UTA   7   0
7.4
401  402          quetane01       Neemias Queta   C   23  SAC   5   0
5.8
415  416          robinmi01   Mitchell Robinson   C   24  NYK  59  58
27.0
431  432          schakjo01      Jordan Schakel  SF   24  WAS   2   0
3.0
435  436          seabrde01      Dereon Seabron  SG   22  NOP   5   0
2.4
442  443          silvach01         Chris Silva  PF   26  DAL   1   0
3.0
462  463          swideco01         Cole Swider  SF   23  LAL   7   0
5.9
481  482          umudest01       Stanley Umude  SG   23  DET   1   0
2.0
510  511          wieskjo01        Joe Wieskamp  SF   23  TOR   9   0
5.6
514  515          willial06    Alondes Williams  SG   23  BRK   1   0
5.0
```

```
515  516         willido02    Donovan Williams  SG   21  ATL   2   0
2.0
521  522         willima07       Mark Williams   C   21  CHO  43  17
19.3
527  528         windldy01       Dylan Windler  SF   26  CLE   3   0
3.3

      FG  FGA    FG%   3P  3PA    3P%   2P  2PA    2P%   eFG%   FT
FTA  \
14   0.5  1.9  0.243  0.4  1.2  0.348  0.1  0.7  0.071  0.351  0.0
0.0
17   1.6  2.0  0.819  0.0  0.0    NaN  1.6  2.0  0.819  0.819  0.2
0.6
42   2.0  3.4  0.578  0.0  0.0    NaN  2.0  3.4  0.578  0.578  0.4
1.1
47   0.2  1.4  0.150  0.0  0.3  0.000  0.2  1.1  0.188  0.150  0.0
0.0
65   1.7  2.7  0.635  0.0  0.0    NaN  1.7  2.7  0.635  0.635  0.9
2.0
66   0.0  1.0  0.000  0.0  0.5  0.000  0.0  0.5  0.000  0.000  0.0
0.0
72   0.0  1.0  0.000  0.0  0.5  0.000  0.0  0.5  0.000  0.000  0.0
0.0
73   2.5  5.3  0.469  1.2  2.3  0.500  1.3  3.0  0.444  0.578  0.0
0.0
81   0.2  0.7  0.250  0.0  0.0    NaN  0.2  0.7  0.250  0.250  0.2
0.2
87   1.0  3.0  0.333  0.2  1.0  0.200  0.8  2.0  0.400  0.367  0.0
0.0
97   3.0  5.0  0.600  0.0  0.0    NaN  3.0  5.0  0.600  0.600  1.0
4.0
125  1.3  1.7  0.800  0.3  0.7  0.500  1.0  1.0  1.000  0.900  0.0
0.0
128  0.2  1.7  0.100  0.2  0.7  0.250  0.0  1.0  0.000  0.150  0.0
0.0
130  0.6  2.1  0.303  0.1  1.0  0.125  0.5  1.1  0.471  0.333  0.0
0.0
150  0.0  0.0    NaN  0.0  0.0    NaN  0.0  0.0    NaN    NaN  0.0
0.0
155  3.7  5.1  0.732  0.0  0.0    NaN  3.7  5.1  0.732  0.732  1.6
2.4
165  1.0  3.0  0.333  1.0  3.0  0.333  0.0  0.0    NaN  0.500  0.0
0.0
211  0.4  0.8  0.500  0.2  0.6  0.333  0.2  0.2  1.000  0.625  0.0
0.0
232  0.0  3.0  0.000  0.0  1.0  0.000  0.0  2.0  0.000  0.000  0.0
0.0
262  0.3  1.3  0.250  0.3  1.3  0.250  0.0  0.0    NaN  0.375  0.0
0.0
```

```
265  0.3  0.3  1.000  0.0  0.0    NaN  0.3  0.3  1.000  1.000  0.7
0.7
340  0.5  1.0  0.500  0.0  0.0    NaN  0.5  1.0  0.500  0.500  0.0
1.0
343  0.8  2.3  0.333  0.3  0.8  0.333  0.5  1.5  0.333  0.389  0.0
0.0
384  4.2  6.1  0.680  0.0  0.0    NaN  4.2  6.1  0.680  0.680  2.5
4.0
393  1.4  2.1  0.667  0.6  1.0  0.571  0.9  1.1  0.750  0.800  0.0
0.0
401  1.2  1.8  0.667  0.0  0.0    NaN  1.2  1.8  0.667  0.667  0.0
0.4
415  3.2  4.7  0.671  0.0  0.0    NaN  3.2  4.7  0.671  0.671  1.0
2.1
431  0.5  1.0  0.500  0.5  0.5  1.000  0.0  0.5  0.000  0.750  0.0
0.0
435  0.4  1.0  0.400  0.0  0.0    NaN  0.4  1.0  0.400  0.400  0.0
0.0
442  1.0  1.0  1.000  0.0  0.0    NaN  1.0  1.0  1.000  1.000  0.0
0.0
462  0.4  1.3  0.333  0.4  1.1  0.375  0.0  0.1  0.000  0.500  0.0
0.0
481  0.0  1.0  0.000  0.0  1.0  0.000  0.0  0.0    NaN  0.000  2.0
2.0
510  0.3  1.6  0.214  0.3  1.3  0.250  0.0  0.2  0.000  0.321  0.0
0.0
514  0.0  0.0    NaN  0.0  0.0    NaN  0.0  0.0    NaN    NaN  0.0
0.0
515  1.0  2.5  0.400  0.0  1.0  0.000  1.0  1.5  0.667  0.400  0.0
0.0
521  3.7  5.8  0.637  0.0  0.0    NaN  3.7  5.8  0.637  0.637  1.6
2.3
527  0.7  1.0  0.667  0.3  0.7  0.500  0.3  0.3  1.000  0.833  0.0
0.0

       FT%  ORB  DRB  TRB  AST  STL  BLK  TOV   PF   PTS    MP   PER
TS%  \
14     NaN  0.0  0.8  0.8  1.2  0.3  0.0  0.4  0.9   1.3   172   2.7
0.351
17   0.350  0.9  2.4  3.3  0.3  0.2  0.4  0.5  0.9   3.5   359  16.1
0.774
42   0.357  1.5  2.8  4.3  0.9  0.3  1.4  0.8  1.9   4.3   874  14.4
0.555
47     NaN  0.3  0.2  0.5  0.5  0.2  0.1  0.5  0.7   0.4    68  -5.0
0.150
65   0.458  1.6  2.3  3.9  0.1  0.1  0.4  0.4  1.1   4.3   294  22.2
0.607
66     NaN  0.8  1.3  2.0  0.5  0.8  0.0  0.0  1.0   0.0    24   7.0
0.000
```

```
72     NaN  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0   0.0     6 -12.6
0.000
73     NaN  0.2  0.5  0.7  1.3  0.8  0.0  0.8  0.8   6.2    77  13.0
0.578
81   1.000  0.3  0.7  1.0  0.3  0.2  0.2  0.2  0.5   0.5    28  10.8
0.338
87     NaN  0.6  1.0  1.6  0.8  0.2  0.0  0.0  0.4   2.2    34  10.3
0.367
97   0.250  2.0  1.0  3.0  0.0  0.0  1.0  0.0  0.0   7.0    21  12.2
0.518
125    NaN  0.3  0.3  0.7  0.0  0.0  0.0  0.0  0.0   3.0     8  45.5
0.900
128    NaN  1.0  0.7  1.7  1.3  0.8  0.0  0.5  1.5   0.5    53   4.8
0.150
130    NaN  0.1  0.8  0.9  0.6  0.4  0.1  0.3  0.4   1.4    79   5.2
0.333
150    NaN  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0   0.0     1   0.0
NaN
155  0.679  2.1  3.5  5.6  1.1  0.4  1.3  1.1  2.4   9.0  1604  19.7
0.739
165    NaN  0.0  4.0  4.0  7.0  3.0  0.0  2.0  3.0   3.0    41   7.3
0.500
211    NaN  0.0  0.6  0.6  0.0  0.0  0.0  0.0  0.2   1.0     9  15.4
0.625
232    NaN  1.0  1.0  2.0  1.0  0.0  0.0  0.0  0.0   0.0     5  -6.8
0.000
262    NaN  0.0  0.7  0.7  0.0  0.0  0.0  0.0  0.0   1.0     8   3.7
0.375
265  1.000  0.0  0.3  0.3  0.0  0.0  0.0  0.0  0.0   1.3     9  18.6
1.064
340  0.000  1.0  0.0  1.0  0.5  0.0  0.0  1.0  1.0   1.0     8  -3.5
0.347
343    NaN  0.0  0.8  0.8  1.3  0.0  0.0  0.3  0.5   1.8    20   7.2
0.389
384  0.636  2.9  6.0  8.9  3.1  0.6  0.6  1.5  2.7  10.8  2054  19.6
0.689
393    NaN  0.4  1.9  2.3  0.6  0.1  0.0  0.3  0.7   3.4    52  18.6
0.800
401  0.000  1.0  1.2  2.2  0.2  0.0  0.4  0.2  1.4   2.4    29  17.0
0.607
415  0.484  4.5  4.9  9.4  0.9  0.9  1.8  0.7  2.7   7.4  1591  18.9
0.652
431    NaN  0.0  0.0  0.0  0.5  0.5  0.0  0.0  0.5   1.5     6  24.3
0.750
435    NaN  0.2  0.0  0.2  0.0  0.0  0.0  0.0  0.2   0.8    12   4.6
0.400
442    NaN  0.0  0.0  0.0  0.0  0.0  0.0  1.0  2.0   2.0     3  -2.2
1.000
462    NaN  0.1  0.9  1.0  0.6  0.0  0.0  0.0  0.4   1.3    41   7.4
```

```
0.500
481  1.000  0.0  0.0  0.0  0.0  1.0  1.0  0.0  0.0   2.0     2  65.6
0.532
510    NaN  0.0  0.4  0.4  0.3  0.0  0.0  0.1  0.3   1.0    50  -0.4
0.321
514    NaN  0.0  1.0  1.0  0.0  0.0  0.0  2.0  1.0   0.0     5 -20.9
NaN
515    NaN  0.0  1.0  1.0  0.0  0.0  0.0  0.0  0.0   2.0     4  14.5
0.400
521  0.691  2.2  4.9  7.1  0.4  0.7  1.0  0.9  2.2   9.0   828  19.8
0.659
527    NaN  0.0  0.0  0.0  0.3  0.3  0.0  0.3  0.0   1.7    10  19.0
0.833

      3PAr    FTr  ORB%  DRB%  TRB%  AST%  STL%  BLK%   TOV%  USG%
OWS  DWS  \
14   0.622  0.000   0.0  10.0   5.0  16.9   1.4   0.0   15.9  11.1 -
0.2  0.1
17   0.000  0.278   9.5  26.1  17.9   4.3   0.8   3.5   18.2  11.5
0.6  0.4
42   0.000  0.340  11.0  22.1  16.5   8.7   1.0   9.0   17.7  14.0
0.2  1.6
47   0.200  0.000   6.5   4.7   5.6  12.3   2.1   1.2   25.9  16.6 -
0.4  0.0
65   0.000  0.750  22.0  30.9  26.5   2.1   0.7   4.2   10.5  21.2
0.7  0.4
66   0.500  0.000  13.9  21.6  17.8   9.4   5.9   0.0    0.0   7.0
0.0  0.1
72   0.500  0.000   0.0   0.0   0.0   0.0   0.0   0.0    0.0  14.3
0.0  0.0
73   0.438  0.000   1.4   4.3   2.8  15.0   3.1   0.0   13.5  20.1
0.0  0.1
81   0.000  0.250  12.4  30.6  21.8  13.3   3.5   6.0   18.4  16.9 -
0.1  0.1
87   0.333  0.000   9.6  17.1  13.1  16.3   1.4   0.0    0.0  19.2
0.0  0.0
97   0.000  0.800  10.9   5.5   8.2   0.0   0.0   4.2    0.0  14.0
0.0  0.0
125  0.400  0.000  14.4  14.7  14.5   0.0   0.0   0.0    0.0  28.3
0.1  0.0
128  0.400  0.000  13.1   8.1  10.5  17.6   4.6   0.0   23.1  10.7 -
0.1  0.1
130  0.485  0.000   1.5  18.7  10.1  16.3   3.6   1.1   13.2  20.6 -
0.3  0.1
150    NaN    NaN   0.0   0.0   0.0   0.0   0.0   0.0    NaN   0.0
0.0  0.0
155  0.000  0.473  11.7  18.0  15.0   7.5   1.0   5.2   15.1  15.2
4.2  1.9
165  1.000  0.000   0.0  10.3   5.2  19.4   3.5   0.0   40.0   5.1
```

```
0.0  0.1
211  0.750  0.000   0.0  37.2  18.9   0.0   0.0   0.0    0.0  19.7
0.0  0.0
232  0.333  0.000  21.9  21.3  21.6  22.7   0.0   0.0    0.0  25.1
0.0  0.0
262  1.000  0.000   0.0  27.6  13.7   0.0   0.0   0.0    0.0  21.4
0.0  0.0
265  0.000  2.000   0.0  12.7   6.2   0.0   0.0   0.0    0.0   8.9
0.0  0.0
340  0.000  1.000  28.8   0.0  14.3  16.1   0.0   0.0   41.0  26.2
0.0  0.0
343  0.333  0.000   0.0  16.6   8.4  35.7   0.0   0.0   10.0  21.8
0.0  0.0
384  0.000  0.647  11.8  25.1  18.4  17.3   1.1   2.0   15.8  15.2
5.5  2.4
393  0.467  0.000   6.3  26.7  16.6  11.2   0.9   0.0   11.8  13.7
0.2  0.0
401  0.000  0.222  19.8  23.5  21.7   5.0   0.0   6.0    9.2  16.1
0.1  0.0
415  0.000  0.436  18.4  20.0  19.2   4.5   1.7   6.5   10.9  10.1
4.0  2.6
431  0.500  0.000   0.0   0.0   0.0  23.5   8.1   0.0    0.0  14.5
0.0  0.0
435  0.000  0.000   9.5   0.0   4.7   0.0   0.0   0.0    0.0  17.9
0.0  0.0
442  0.000  0.000   0.0   0.0   0.0   0.0   0.0   0.0   50.0  30.1
0.0  0.0
462  0.889  0.000   2.7  15.2   9.1  12.0   0.0   0.0    0.0   9.3
0.0  0.0
481  1.000  2.000   0.0   0.0   0.0   0.0  24.2  44.1    0.0  40.0
0.0  0.0
510  0.857  0.000   0.0   9.8   4.5   7.4   0.0   0.0    6.7  12.8 -
0.1  0.0
514    NaN    NaN   0.0  22.0  11.2   0.0   0.0   0.0  100.0  17.7 -
0.1  0.0
515  0.400  0.000   0.0  55.4  27.4   0.0   0.0   0.0    0.0  52.5
0.0  0.0
521  0.000  0.386  11.7  27.7  19.6   3.3   1.6   4.7   12.0  17.0
1.5  1.3
527  0.667  0.000   0.0   0.0   0.0  15.2   5.0   0.0   25.0  17.9
0.0  0.0

      WS   WS48  OBPM  DBPM   BPM  VORP
14  -0.2 -0.043  -7.3  -1.5  -8.8  -0.3
17   1.0  0.134  -1.2   0.5  -0.6   0.1
42   1.9  0.102  -3.4   2.5  -0.9   0.2
47  -0.3 -0.231 -12.4  -2.3 -14.7  -0.2
65   1.1  0.179   0.6  -1.2  -0.6   0.1
66   0.0  0.040  -7.7   4.3  -3.3   0.0
```

```
72   0.0 -0.347 -13.9 -10.4 -24.2   0.0
73   0.1  0.061  -2.2  -0.4  -2.6   0.0
81   0.0  0.014  -7.1   2.1  -5.0   0.0
87   0.0  0.009  -5.1  -2.8  -7.9  -0.1
97   0.0  0.043  -2.6  -4.9  -7.5   0.0
125  0.1  0.367  17.0   0.8  17.8   0.0
128  0.0 -0.025  -7.0   1.8  -5.3   0.0
130 -0.2 -0.097  -8.6   0.7  -7.8  -0.1
150  0.0  0.010  -7.2  -1.9  -9.2   0.0
155  6.1  0.184   0.4   0.6   1.0   1.2
165  0.1  0.079  -7.8   1.7  -6.1   0.0
211  0.0  0.125   1.6   0.8   2.4   0.0
232  0.0 -0.378 -12.5  -9.8 -22.2   0.0
262  0.0 -0.062  -7.4  -5.6 -13.0   0.0
265  0.0  0.242   2.1   0.8   2.9   0.0
340  0.0 -0.288 -12.7  -8.0 -20.7   0.0
343  0.0 -0.030  -4.1  -1.0  -5.1   0.0
384  7.9  0.185   1.2   1.0   2.2   2.2
393  0.2  0.186   2.4   1.2   3.5   0.1
401  0.1  0.149  -2.6  -0.8  -3.4   0.0
415  6.5  0.197   1.0   1.4   2.4   1.7
431  0.0  0.314   7.7   9.3  17.0   0.0
435  0.0 -0.034  -6.6  -4.7 -11.3   0.0
442  0.0 -0.260 -22.5  -0.1 -22.6   0.0
462  0.1  0.080  -2.9  -0.5  -3.4   0.0
481  0.0  0.626  15.9  32.7  48.6   0.0
510 -0.1 -0.076  -7.0  -3.6 -10.6  -0.1
514 -0.1 -0.517 -21.3  -5.2 -26.5   0.0
515  0.0 -0.225  -9.1  -6.1 -15.2   0.0
521  2.8  0.163  -0.5   0.6   0.1   0.4
527  0.0  0.149   3.2   3.5   6.7   0.0
```

```
#the data is null because they registered 0 in those metrics. Thus, we
can change the null to 0.
player_data.fillna(0,inplace=True)

#insert team rankings
team_data=pd.read_excel('team_rankings.xlsx')
team_data.head()
```

```
   Rk                Team Team_abv  Win  Lose  win_perc   Home   Road
E  \
0   1      Milwaukee Bucks      MIL   58    24  0.707317   32-9  26-15
35-17
1   2       Boston Celtics      BOS   57    25  0.695122   32-9  25-16
34-18
2   3   Philadelphia 76ers      PHI   54    28  0.658537  29-12  25-16
34-18
3   4       Denver Nuggets      DEN   53    29  0.646341   34-7  19-22
19-11
```

```
4   5  Cleveland Cavaliers      CLE   51    31  0.621951  31-10  20-21
34-18

       W     A     C    SE    NW     P    SW    Pre   Post  â‰¤3  â‰
¥10  Oct  \
0   23-7  12-6  11-5  12-6   9-1   8-2   6-4  41-17   17-7   6-1  30-
15  6-0
1   23-7  11-5  11-7  12-6   7-3   7-3   9-1  42-17   15-8   5-8  31-
11  4-2
2  20-10  10-6  13-5  11-7   7-3   8-2   5-5  38-19   16-9  10-5  26-
11  4-4
3  34-18   4-6   7-3   8-2  10-6  13-5  11-7  41-18  12-11   7-6  29-
15  4-3
4  17-13  8-10  13-3  13-5   4-6   5-5   8-2  38-23   13-8   5-8  33-
11  5-1

    Nov  Dec   Jan   Feb   Mar  Apr
0   9-5  8-7  11-5  10-0  11-5  3-2
1  14-2  8-6  10-5   8-3  10-6  3-1
2   8-6  9-4  11-3   7-4  12-5  3-2
3  10-4  9-5  12-4   9-3   7-7  2-3
4   9-7  9-6   8-8   8-3   9-5  3-1
```

```
#merge with team
player_data2=player_data.merge(team_data[['Team_abv','win_perc']],left
_on='Tm',right_on='Team_abv')

#Filter PF players that played more than 30 games and more than 13.5
minutes
PF_data=player_data2[player_data2['Pos']=='PF']
PF_data_cleaned=PF_data[(PF_data['G'] >= 30) & (PF_data['MPG'] >=
13.5)].reset_index()

#For Top and Bottom categories
top =
['MIL','BOS','PHI','DEN','MEM','CLE','SAC','NYK','PHO','BRK','MIA','LA
C','GSW','LAL','MIN']
bot =
['NOP','ATL','TOR','CHI','OKC','DAL','UTA','IND','WAS','ORL','POR','CH
O','HOU','SAS','DET']
PF_data_cleaned['Standing']=['Top' if i in top else 'Bottom' for i in
PF_data_cleaned['Tm']]

#Check T-Test Result for PF and Show statistically significant metrics
included=['FG', 'FGA', 'FG%', '3P', '3PA', '3P%', '2P', '2PA', '2P%',
       'eFG%', 'FT', 'FTA', 'FT%', 'ORB', 'DRB', 'TRB', 'AST', 'STL',
'BLK',
       'TOV', 'PF', 'PTS', 'PER', 'TS%', '3PAr', 'FTr', 'ORB%', 'DRB
%',
       'TRB%', 'AST%', 'STL%', 'BLK%', 'TOV%', 'USG%', 'OWS', 'DWS',
```

```
'WS',
       'WS48', 'OBPM', 'DBPM', 'BPM', 'VORP']
result=[]
import scipy.stats as stats
for i in included:
    bfg=PF_data_cleaned[PF_data_cleaned['Standing']=='Bottom'][i]
    tfg=PF_data_cleaned[PF_data_cleaned['Standing']=='Top'][i]
    result.append(stats.ttest_ind(a=bfg, b=tfg,equal_var=True).pvalue)
alpha=0.05
decision=[]
for i in result:
    if i < alpha:
        decision.append('Reject')
    else:
        decision.append('Accept')
final=pd.DataFrame(data={'Metrics':included,'P-
Value':result,'Decision':decision})
final[final['Decision']=='Reject'].sort_values(by='P-Value')
```

	Metrics	P-Value	Decision
9	eFG%	0.000683	Reject
37	WS48	0.001413	Reject
23	TS%	0.003442	Reject
39	DBPM	0.005503	Reject
35	DWS	0.013504	Reject
36	WS	0.014428	Reject
40	BPM	0.014838	Reject
41	VORP	0.035104	Reject
34	OWS	0.043615	Reject

```
#insert salary data and merge with PF data
salary = pd.read_excel('salary_players.xlsx')
PF_data_wSalary=PF_data_cleaned.merge(salary,left_on='Player',right_on
='PLAYER')

#To filter only metrics that are statistically significant and other
important columns
final_metrics=final[final['Decision']=='Reject']['Metrics']
final_metrics_list=[i for i in final_metrics]
final_metrics_list.append('Player')
final_metrics_list.append('salary_currentDollar')
final_metrics_list.append('Standing')
final_metrics_list.append('Tm')
final_metrics_list.append('Pos')

#Final Dataset
PF_final_metrics=PF_data_wSalary[final_metrics_list]

#Assign Weights
weights={i:1/9 for i in final_metrics}
```

```
#Insert Weighting Calculations

for stat in weights.keys():
    max_value = PF_final_metrics[stat].max()
    PF_final_metrics.loc[:, stat + '_norm'] = PF_final_metrics[stat] /
max_value

PF_final_metrics.loc[:, 'Weighted_Score'] = sum([PF_final_metrics[stat
+ '_norm'] * weight for stat, weight in weights.items()])

# Rank players
ranked_PF = PF_final_metrics.sort_values('Weighted_Score',
ascending=False)

# Display the top ranked players
print(ranked_PF[['Player', 'Weighted_Score','salary_currentDollar']])
```

	Player	Weighted_Score	salary_currentDollar
5	Jimmy Butler	0.904961	38771293
12	Giannis Antetokounmpo	0.821356	43754169
23	Kevin Durant	0.672162	45429841
14	Evan Mobley	0.619509	8730468
30	LeBron James	0.566235	45795529
36	Julius Randle	0.559894	24465476
3	Brandon Clarke	0.547184	4472897
10	Kyle Anderson	0.543034	9041196
9	Lauri Markkanen	0.535737	16964639
1	Pascal Siakam	0.528294	36501206
25	Draymond Green	0.513003	26572707
31	Jarred Vanderbilt	0.494678	4503871
44	Aaron Gordon	0.487153	21305258
48	Cameron Johnson	0.428816	6062721
39	Robert Covington	0.411902	12673129
38	Nicolas Batum	0.407256	20285256
13	Bobby Portis	0.392633	11165308
50	Grant Williams	0.384106	4434142
22	Torrey Craig	0.371698	5274030
55	Kenrich Williams	0.370002	2059383
2	Thaddeus Young	0.368933	8237534
52	Josh Giddey	0.359838	6474084
0	Chris Boucher	0.358045	13066788
15	Dean Wade	0.356323	1988006
43	John Collins	0.339439	24197756
34	Harrison Barnes	0.334503	18897184
7	Kevin Love	0.330760	31464258
42	Patrick Williams	0.329920	8006265
17	Bol Bol	0.329463	2265321
26	JaMychal Green	0.329246	8443471
18	Jerami Grant	0.282994	21577191
53	Aleksej Pokusevski	0.276719	3358319

```
27         Jonathan Kuminga        0.270725              5910266
32        Keita Bates-Diop         0.258812              1934502
35              Trey Lyles         0.257361              2702940
20          Trendon Watford        0.249674              1609941
37              Obi Toppin         0.246169              5507079
57           Georges Niang         0.244103              3567882
56              Tari Eason         0.234081              3458899
41            Maxi Kleber          0.225553              9267225
54  Jeremiah Robinson-Earl         0.223911              2059383
40           Marcus Morris         0.222221             16858209
16          Paolo Banchero         0.219661             11383366
47     Dorian Finney-Smith         0.216150             13324055
6        Haywood Highsmith         0.207958              1804676
46              Zeke Nnaji         0.196948              2695527
29           Rui Hachimura         0.186427              6449153
24           Isaiah Livers         0.182456              1609941
11          Taurean Prince         0.177466              7310811
45              Jeff Green         0.164791              4633612
21              Kyle Kuzma         0.144403             13385993
4             David Roddy          0.135936              2665501
51           Ousmane Dieng         0.126533              4705526
49          Oshae Brissett         0.117490              1901570
19              Kevin Knox         0.112141              3089075
8                 Rudy Gay         0.097376              6368128
28                JT Thor          0.090607              1609941
33           Jeremy Sochan         0.064714              5213864
```

```
#Export to CSV
final_PF_csv=ranked_PF[['Player','Tm','Pos','Weighted_Score','salary_currentDollar']].reset_index().drop(['index'],axis=1)
final_PF_csv.to_csv('PF_final_list.csv')
```