DESARROLLO LABORATORIO 9

In [1]:
```
#Importando librerias necesarias
import os
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import math as math
import scipy.stats as stats #Para calculo de probabilidades

from sklearn.model_selection import train_test_split #Particionamiento
from sklearn.preprocessing import MinMaxScaler #Utilizar la normalizacion
from sklearn.preprocessing import StandardScaler #Utilizar la estandarizacion
from sklearn.decomposition import PCA #Para la descomposicion de la varianza en el PCA
```

In [2]:
```
os.chdir("D:\Social Data Consulting\Python for Data Science\data")
```

In [4]:
```
miarchivo="nba_logreg2.csv"
df_arrest=pd.read_csv(miarchivo,sep=";")
df_arrest["TARGET_5Yrs"]=df_arrest["TARGET_5Yrs"].astype('int64')
df_arrest.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1329 entries, 0 to 1328
Data columns (total 21 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   Name         1329 non-null   object
 1   GP           1329 non-null   int64
 2   MIN          1329 non-null   float64
 3   PTS          1329 non-null   float64
 4   FGM          1329 non-null   float64
 5   FGA          1329 non-null   float64
 6   FG%          1329 non-null   float64
 7   3P Made      1329 non-null   float64
 8   3PA          1329 non-null   float64
 9   3P%          1329 non-null   float64
 10  FTM          1329 non-null   float64
 11  FTA          1329 non-null   float64
 12  FT%          1329 non-null   float64
 13  OREB         1329 non-null   float64
 14  DREB         1329 non-null   float64
 15  REB          1329 non-null   float64
 16  AST          1329 non-null   float64
 17  STL          1329 non-null   float64
 18  BLK          1329 non-null   float64
 19  TOV          1329 non-null   float64
 20  TARGET_5Yrs  1329 non-null   int64
dtypes: float64(18), int64(2), object(1)
memory usage: 218.2+ KB
```

1. Estandarizar solo las variables continuas

In [10]:
```
#Separando las variables continuas
continuas = ['GP','MIN','PTS','FGM','FGA','FG%','3P Made','3PA','3P%','FTM','FTA','FT%','OREB'
             ,'DREB','REB','AST','STL','BLK','TOV'
             ]
x = df_arrest.loc[:, continuas].values
#Separando las variable target
y = df_arrest['TARGET_5Yrs'].values
```

In [12]:
```
#Particionando los datos
xtrain,xtest,ytrain,ytest=train_test_split(x,y,test_size=0.3,random_state=0,stratify=y)
```

Estandarizacion (X - Xmean)/(DesvX)

In [13]:
```
#Instanciando un objeto de la clase MinMaxScaler
sc=StandardScaler()
#Aprendiendo y transformando
xtrain_std=sc.fit_transform(xtrain)
```

In [14]:
```
#Ojo: Con lo aprendido de xtrain se debe realizar la transformacion para el Xtest
xtest_std=sc.transform(xtest)
```

In [15]:
```
#Creando un nuevo dataframe con los datos estandarizados
df_arrest_std=pd.DataFrame(xtrain_std,columns=continuas)
df_arrest_std.head()
```

Out[15]:

	GP	MIN	PTS	FGM	FGA	FG%	3P Made	3PA	3P%	FTM	FT
0	-0.719662	-0.995681	-1.118599	-1.139285	-0.943118	-2.419002	-0.652122	-0.739133	-1.194836	-0.808896	-0.77280
1	-2.848945	-0.842179	-1.005949	-0.906612	-1.134714	2.561225	-0.652122	-0.739133	-1.194836	-1.112395	-0.99911
2	0.143561	-0.440712	-0.487761	-0.441266	-0.477813	0.394503	-0.652122	-0.739133	-1.194836	-0.404230	-0.32016
3	-0.489469	-0.606022	-0.915829	-0.906612	-1.079972	1.494033	-0.652122	-0.739133	-1.194836	-0.606563	-0.47104
4	-0.662114	-1.007489	-1.118599	-1.139285	-1.079972	-1.853067	-0.390259	-0.176618	0.133145	-0.808896	-0.77280

2. Grafico PCA

In [22]:
```
#Instanciando un objeto de la clase PCA
pca=PCA() #Tantos PCA como variables originales
xtrain_pca=pca.fit_transform(xtrain_std)
```

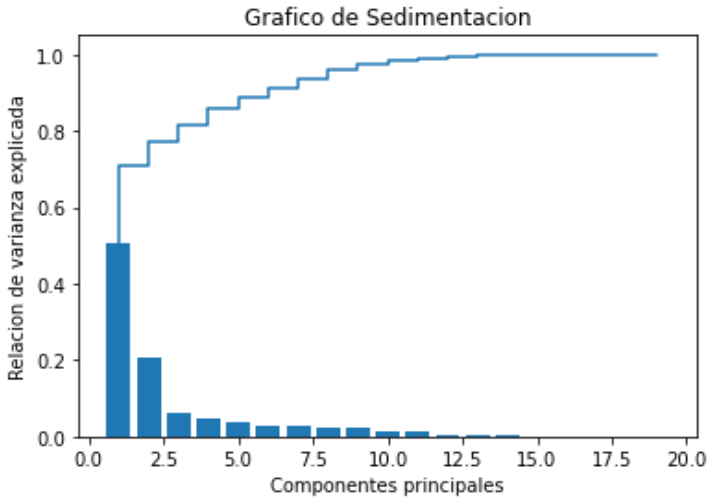
In [23]:
```
varianzaexplicada=pca.explained_variance_ratio_
varianzaexplicada
```

Out[23]:
```
array([5.06237548e-01, 2.04386335e-01, 6.03482329e-02, 4.63957625e-02,
       3.89997749e-02, 3.00314594e-02, 2.65342538e-02, 2.40831740e-02,
       2.22500582e-02, 1.31671650e-02, 1.24505682e-02, 5.52761017e-03,
       5.33545087e-03, 2.80618679e-03, 7.53505411e-04, 4.17559902e-04,
       2.48009128e-04, 1.83875727e-05, 8.95851200e-06])
```

In [24]:
```
varianzaacumulada=np.cumsum(varianzaexplicada)
varianzaacumulada
```

Out[24]:
```
array([0.50623755, 0.71062388, 0.77097212, 0.81736788, 0.85636765,
       0.88639911, 0.91293337, 0.93701654, 0.9592666 , 0.97243376,
       0.98488433, 0.99041194, 0.99574739, 0.99855358, 0.99930708,
       0.99972464, 0.99997265, 0.99999104, 1.        ])
```

In [26]:
```
plt.bar(range(1,len(df_arrest_std.columns)+1),varianzaexplicada)
plt.step(range(1,len(df_arrest_std.columns)+1),varianzaacumulada)
plt.ylabel('Relacion de varianza explicada')
plt.xlabel('Componentes principales')
plt.title('Grafico de Sedimentacion')
plt.show()
```



3. Kriterio de keiser con la varianza explicada de los 3 primeros componentes

In [27]:
```
#Construyendo la matriz varianza-covarianza
cov_mat=np.cov(xtrain_std.T) #T es la transpuesta
```

In [28]:
```
autovalores, autovectores= np.linalg.eig(cov_mat)
print(autovalores)
```

```
[9.62886703e+00 3.88752049e+00 1.14785067e+00 8.82468378e-01
 7.41793351e-01 5.71211935e-01 5.04693504e-01 4.58072858e-01
 4.23206166e-01 2.50445431e-01 2.36815437e-01 1.01482688e-01
 1.05137644e-01 5.33749414e-02 1.43320136e-02 7.94217812e-03
 4.71724574e-03 3.49739946e-04 1.70394948e-04]
```

In [35]:
```
valoresKeiser=(autovalores>1).sum() #Cumpliendo el critero de Keiser
```

In [30]:
```
print(sorted(autovalores, reverse=True)) #Para ordenar de mayor a menor
```

```
[9.628867026676302, 3.887520493559118, 1.1478506728557742, 0.8824683781411236, 0.74179335101072
56, 0.5712119347980711, 0.504693503942002, 0.4580728583326961, 0.4232061658743858, 0.2504454309
6814414, 0.2368154369967461, 0.10513764444673529, 0.101482687672345, 0.05337494142536764, 0.014
332013579656059, 0.007942178120910469, 0.004717245737088714, 0.0003497399456975399, 0.000170394
94828880104]
```

In [36]:
```
pca=PCA(n_components=valoresKeiser)
x3comp=pca.fit_transform(xtrain_std)
print(x3comp)
```

```
[[-3.39152988 -0.8649925  -0.32035075]
 [-2.91035782 -3.29191978 -1.12642985]
 [-1.00792929 -1.97089674  0.05954897]
 ...
 [ 0.20599633 -3.00522598  0.1779007 ]
 [-2.0766519   1.87580783 -2.03432277]
 [-3.56626731  0.16420025 -0.20608957]]
```

In [37]:
```
df_arrest_x=pd.DataFrame(x3comp,columns=['PC1','PC2','PC3'])
df_arrest_x['TARGET_5Yrs']=ytrain
df_arrest_x.head(10)
```

Out[37]:

	PC1	PC2	PC3	TARGET_5Yrs
0	-3.391530	-0.864992	-0.320351	0
1	-2.910358	-3.291920	-1.126430	0
2	-1.007929	-1.970897	0.059549	1
3	-1.918537	-2.614837	-0.269468	0
4	-3.354599	0.922713	0.362723	1
5	-1.726465	2.121716	-1.083185	0
6	0.030791	-2.792813	-0.359631	1
7	-4.168896	-0.926062	-0.169455	1
8	-0.659899	-2.469046	0.034733	1
9	0.788681	-2.029191	-0.268183	1

In [ ]:
```
```