PandasDataFrames_DataExploration

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Ricardo Kaleb Flores Alfonso, A01198716, IDM

#Ejemplo - Dataset Titanic

Features

```
survival - Survival (0 = No; 1 = Yes)
class - Passenger Class (1 = 1st; 2 = 2nd; 3 = 3rd)
name - Name
sex - Sex
age - Age
sibsp - Number of Siblings/Spouses Aboard
parch - Number of Parents/Children Aboard
ticket - Ticket Number
fare - Passenger Fare
cabin - Cabin
embarked - Port of Embarkation (C = Cherbourg; Q = Queenstown; S = Southampton)
```

1 Exploración de los Datos

```
[ ]: import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     import seaborn as sns
```

2 Descripción de Variables

Ejemplo: Crear un objeto DataFrame con base en un archivo .csv

```
[ ]: #titanic = pd.read_csv('titanic.csv')
     from google.colab import drive
     drive.mount('/content/gdrive')
```

```
Drive already mounted at /content/gdrive; to attempt to forcibly remount, call
drive.mount("/content/gdrive", force_remount=True).
```

```
[ ]: titanic_df = pd.read_csv('/content/gdrive/MyDrive/Pandas/Act2/titanic.csv')
```

```
[ ]: titanic_df.head()
[ ]:    PassengerId  Survived  Pclass  \
     0            1         0       3
     1            2         1       1
     2            3         1       3
     3            4         1       1
     4            5         0       3

                                                      Name     Sex   Age  SibSp  \
     0                             Braund, Mr. Owen Harris    male  22.0      1
     1  Cumings, Mrs. John Bradley (Florence Briggs Th…  female  38.0      1
     2                              Heikkinen, Miss. Laina  female  26.0      0
     3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0      1
     4                            Allen, Mr. William Henry    male  35.0      0

        Parch            Ticket     Fare Cabin Embarked
     0      0         A/5 21171   7.2500   NaN        S
     1      0          PC 17599  71.2833   C85        C
     2      0  STON/O2. 3101282   7.9250   NaN        S
     3      0            113803  53.1000  C123        S
     4      0            373450   8.0500   NaN        S
```

```
[ ]: titanic_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   PassengerId  891 non-null    int64
 1   Survived     891 non-null    int64
 2   Pclass       891 non-null    int64
 3   Name         891 non-null    object
 4   Sex          891 non-null    object
 5   Age          714 non-null    float64
 6   SibSp        891 non-null    int64
 7   Parch        891 non-null    int64
 8   Ticket       891 non-null    object
 9   Fare         891 non-null    float64
 10  Cabin        204 non-null    object
 11  Embarked     889 non-null    object
dtypes: float64(2), int64(5), object(5)
memory usage: 83.7+ KB
```

```
[ ]: # Cantidad de valores únicos de cada variable
     titanic_df.nunique()
```

```
[ ]: PassengerId    891
     Survived         2
```

```
Pclass           3
Name           891
Sex              2
Age             88
SibSp            7
Parch            7
Ticket         681
Fare           248
Cabin          147
Embarked         3
dtype: int64
```

2.1 Exploración de Datos

```
[ ]: titanic_df.describe()
```

```
[ ]:        PassengerId    Survived      Pclass         Age       SibSp  \
     count   891.000000  891.000000  891.000000  714.000000  891.000000
     mean    446.000000    0.383838    2.308642   29.699118    0.523008
     std     257.353842    0.486592    0.836071   14.526497    1.102743
     min       1.000000    0.000000    1.000000    0.420000    0.000000
     25%     223.500000    0.000000    2.000000   20.125000    0.000000
     50%     446.000000    0.000000    3.000000   28.000000    0.000000
     75%     668.500000    1.000000    3.000000   38.000000    1.000000
     max     891.000000    1.000000    3.000000   80.000000    8.000000

                 Parch        Fare
     count  891.000000  891.000000
     mean     0.381594   32.204208
     std      0.806057   49.693429
     min      0.000000    0.000000
     25%      0.000000    7.910400
     50%      0.000000   14.454200
     75%      0.000000   31.000000
     max      6.000000  512.329200
```

¿Tiene sentido obtener estas estadísticas para todas las variables? ¿En cuáles si?

```
[ ]: #Valores nulos
     titanic_df.isnull().sum()
```

```
[ ]: PassengerId      0
     Survived         0
     Pclass           0
     Name             0
     Sex              0
     Age            177
     SibSp            0
```

```
Parch           0
Ticket          0
Fare            0
Cabin         687
Embarked        2
dtype: int64
```

2.2 Variables Cuantitativas

Variables cuantitativas:

2.2.1 Medidas estadísticas:

Incluye medidas de tendencia central y medidas de dispersión.
La varianza y desviación típica, nos indica si los valores se desplazan mucho o poco con respecto de la media. La varianza es como se aleja cada valor de la media. La varianza eleva los valores al cuadrado… nos introduce en una nueva dimensión… La desviación típica es la raíz cuadrada de la varianza. Con la desviación típica volvemos a la dimensión original.

Ejercicio: Define un dataframe que sólo incluya las variables cuantitativas y muestra las medidas estadísticas

[ ]:
```
#Edad
#Se puede obtener las medidas de tendencia central media, mediana y moda para␣
 ↪una variable en particular.
mean_age = titanic_df['Age'].mean()
median_age =titanic_df['Age'].median()
mode_age = titanic_df['Age'].mode()
print("Mean_age:",mean_age)
print("Median_age:",median_age)
print("Mode_age:",mode_age)
```

```
Mean_age: 29.69911764705882
Median_age: 28.0
Mode_age: 0    24.0
Name: Age, dtype: float64
```

Conclusiones: La edad promedio fue 29 La edad al centro es 28 La edad más repetida fue de 24

3 Variables Categóricas

Variables categóricas:

[ ]:
```
titanic_df.describe(include='object')
```

[ ]:
```
                           Name   Sex  Ticket    Cabin Embarked
count                       891   891     891      204      889
unique                      891     2     681      147        3
top     Braund, Mr. Owen Harris  male  347082  B96 B98        S
```

```
freq                              1    577       7         4       644
```

Distribución de frecuencias

```
[ ]: titanic_df.Survived.value_counts()
```

```
[ ]: 0    549
     1    342
     Name: Survived, dtype: int64
```

Análisis:

```
[ ]: titanic_df.Sex.value_counts()
```

```
[ ]: male      577
     female    314
     Name: Sex, dtype: int64
```

Análisis:

```
[ ]: titanic_df.Pclass.value_counts()
```

```
[ ]: 3    491
     1    216
     2    184
     Name: Pclass, dtype: int64
```

```
[ ]: # Create a family size variable including the passenger themselves
     titanic_df["FamilySize"] = titanic_df["SibSp"] + titanic_df["Parch"]+1
     print(titanic_df["FamilySize"].value_counts())
```

```
1     537
2     161
3     102
4      29
6      22
5      15
7      12
11      7
8       6
Name: FamilySize, dtype: int64
```

4 Visualización de datos

4.1 Variables Categóricas

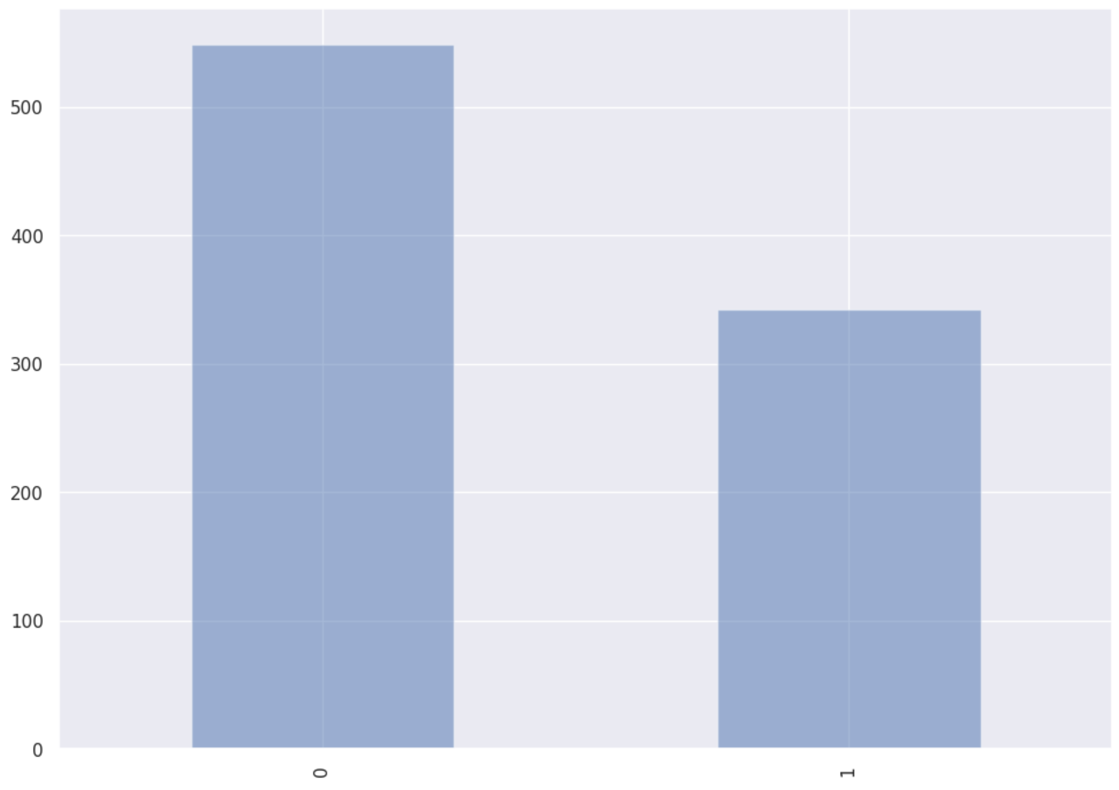
Gráficas de barras, gráficas de pie

```
[ ]: import matplotlib.pyplot as plt       ## wonderful library for data plotting
     fig = plt.figure(figsize=(18,6))      ## To get a figure with proper structure
```

```
<Figure size 1800x600 with 0 Axes>
```

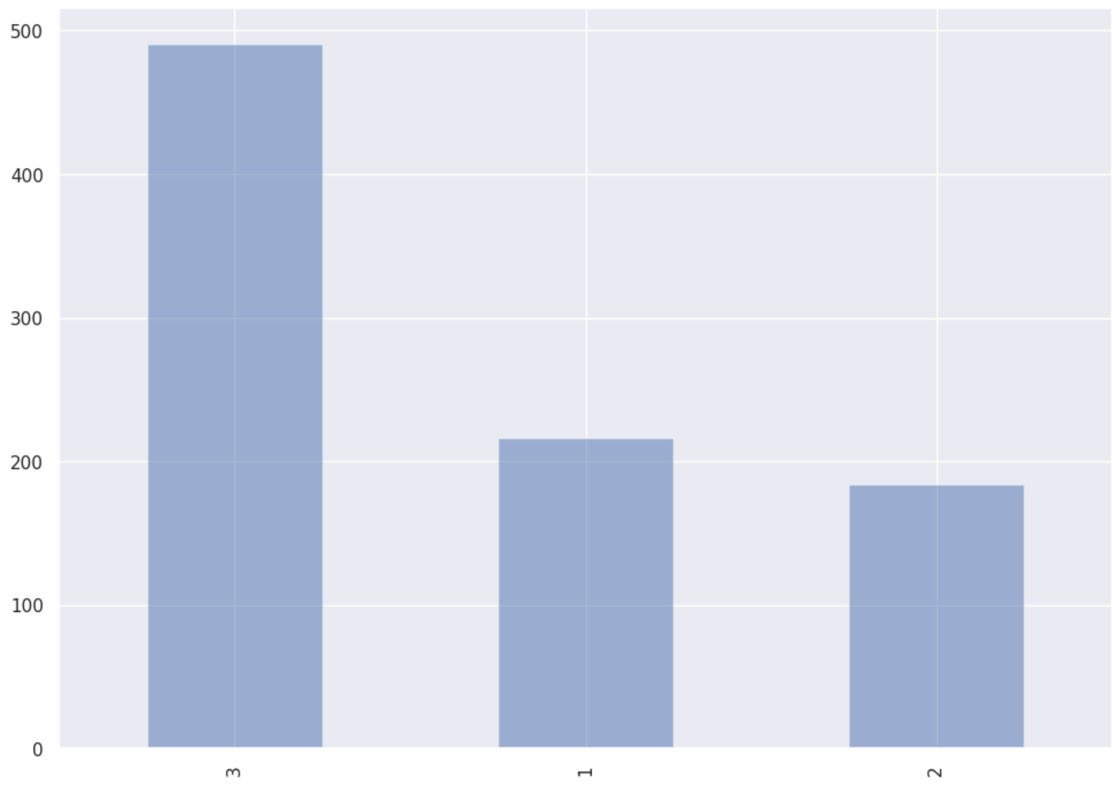
```
[ ]: titanic_df.Survived.value_counts().plot(kind="bar",alpha=0.5)
```

```
[ ]: <Axes: >
```



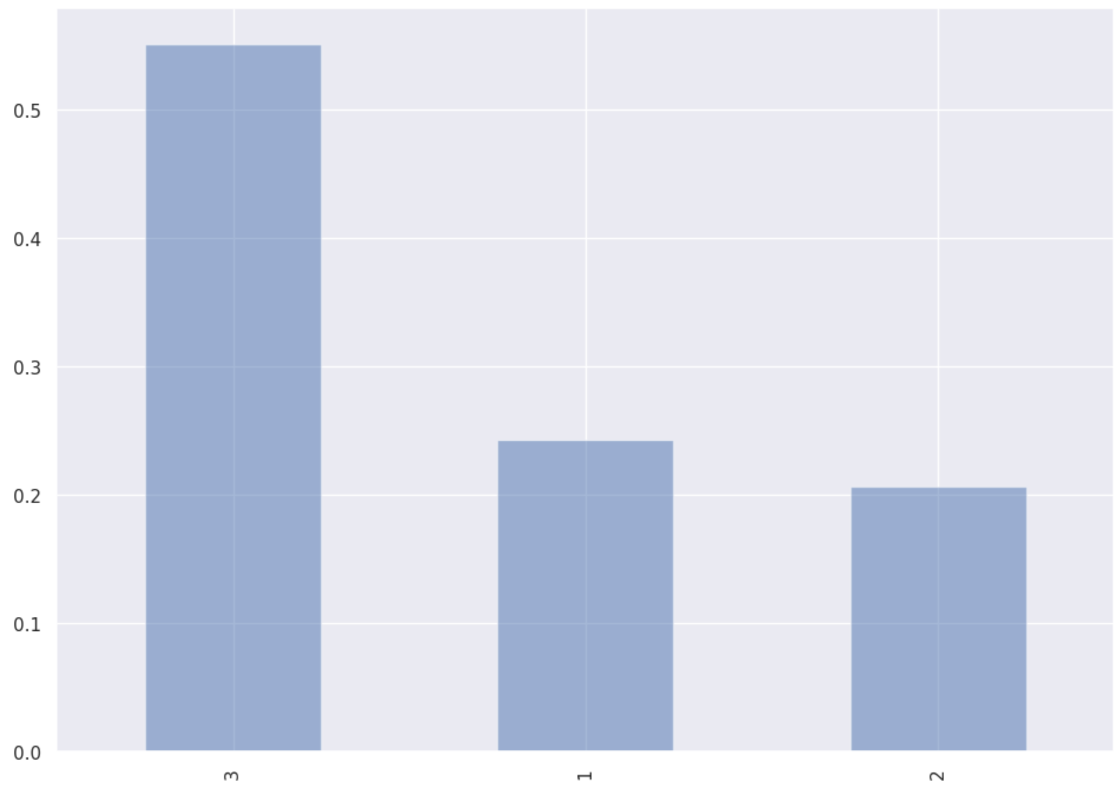
```
[ ]: titanic_df.Pclass.value_counts().plot(kind="bar", alpha = 0.5)
```

```
[ ]: <Axes: >
```



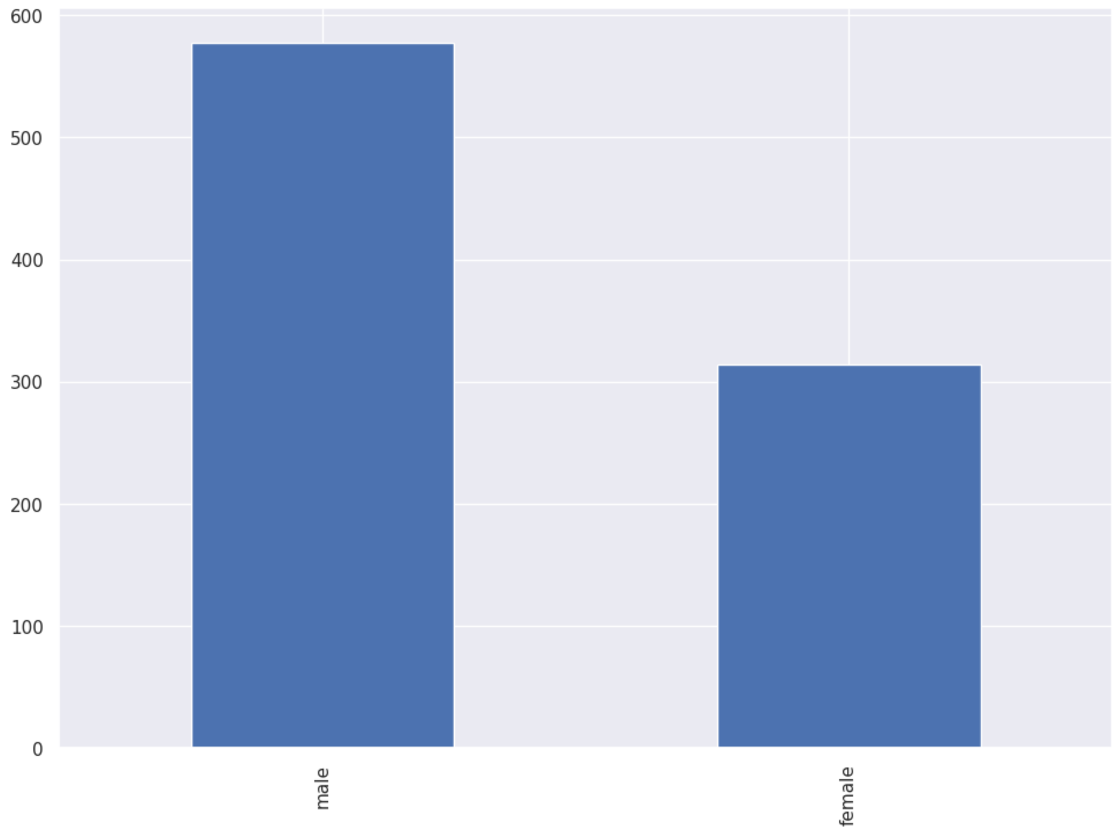
```
[ ]: titanic_df.Pclass.value_counts(normalize=True).plot(kind="bar", alpha = 0.5)
```

```
[ ]: <Axes: >
```



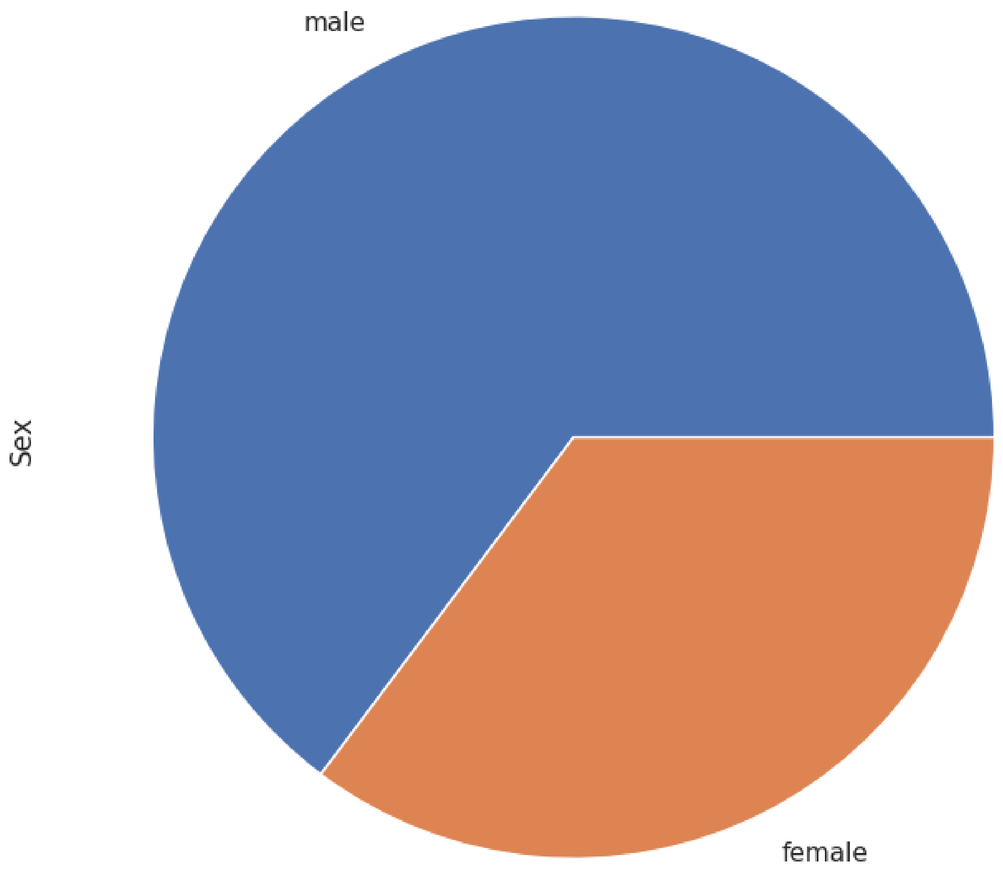
```
[ ]: plotData=titanic_df.Sex.value_counts()
     plotData.plot(kind='bar')
```

```
[ ]: <Axes: >
```

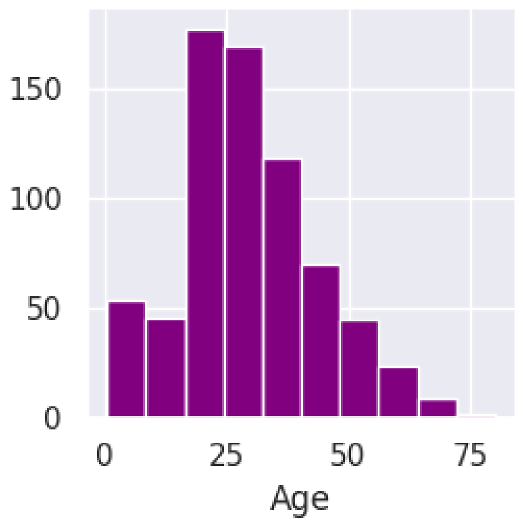


```
[ ]: plotData.plot(kind='pie')
```

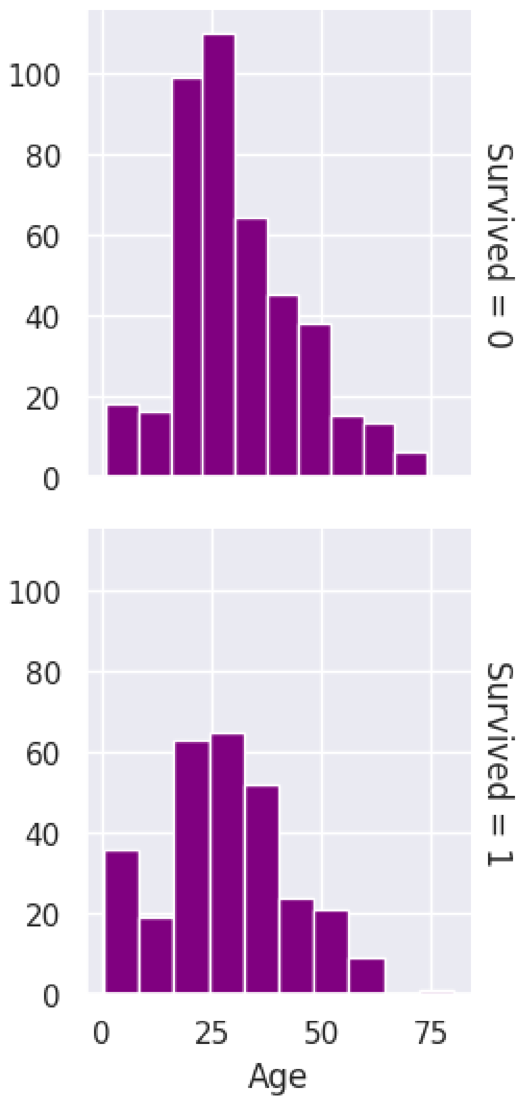
```
[ ]: <Axes: ylabel='Sex'>
```



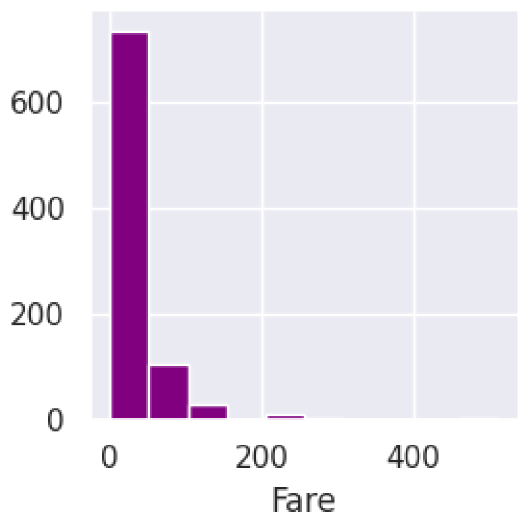
```
[ ]: g = sns.FacetGrid(titanic_df, margin_titles=True)
     g.map(plt.hist, "Age",color="purple");
```



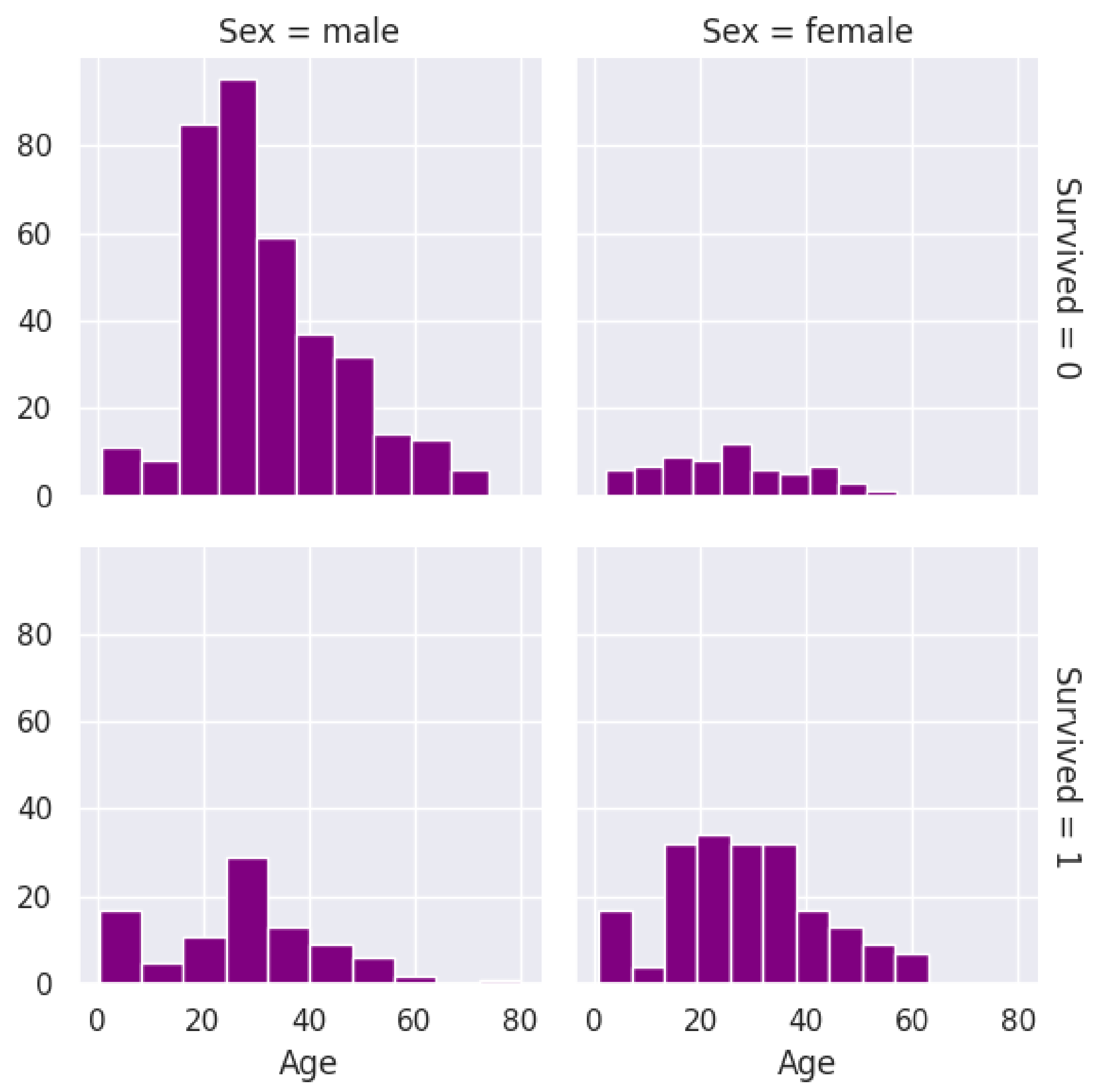
```
[ ]: g = sns.FacetGrid(titanic_df, row="Survived", margin_titles=True)
     g.map(plt.hist, "Age",color="purple");
```



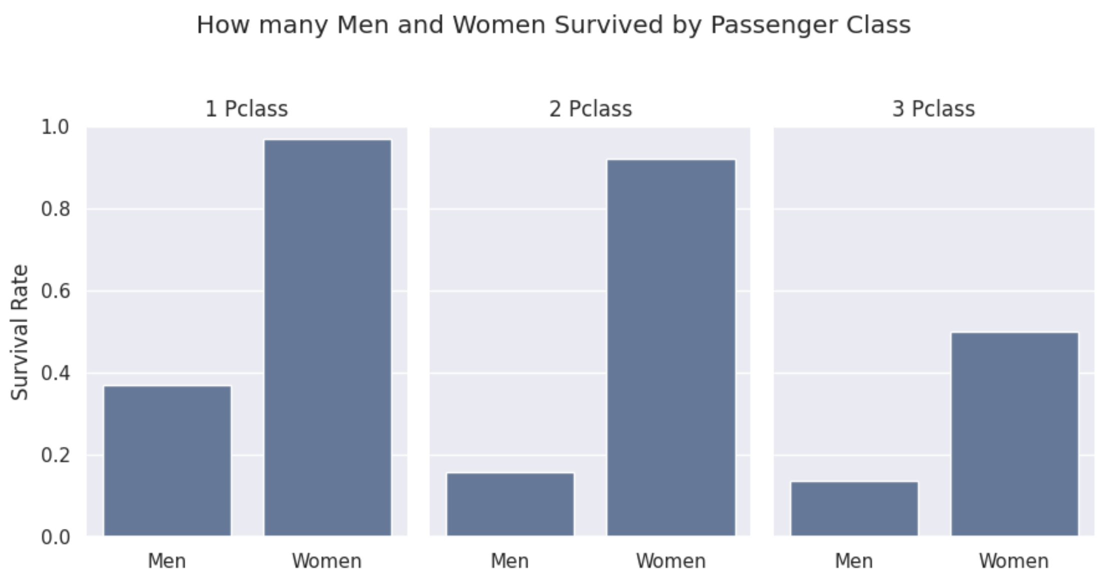
```
[ ]: g = sns.FacetGrid(titanic_df, margin_titles=True)
     g.map(plt.hist, "Fare",color="purple");
```



```
[ ]: g = sns.FacetGrid(titanic_df, col="Sex", row="Survived", margin_titles=True)
     g.map(plt.hist, "Age",color="purple");
```



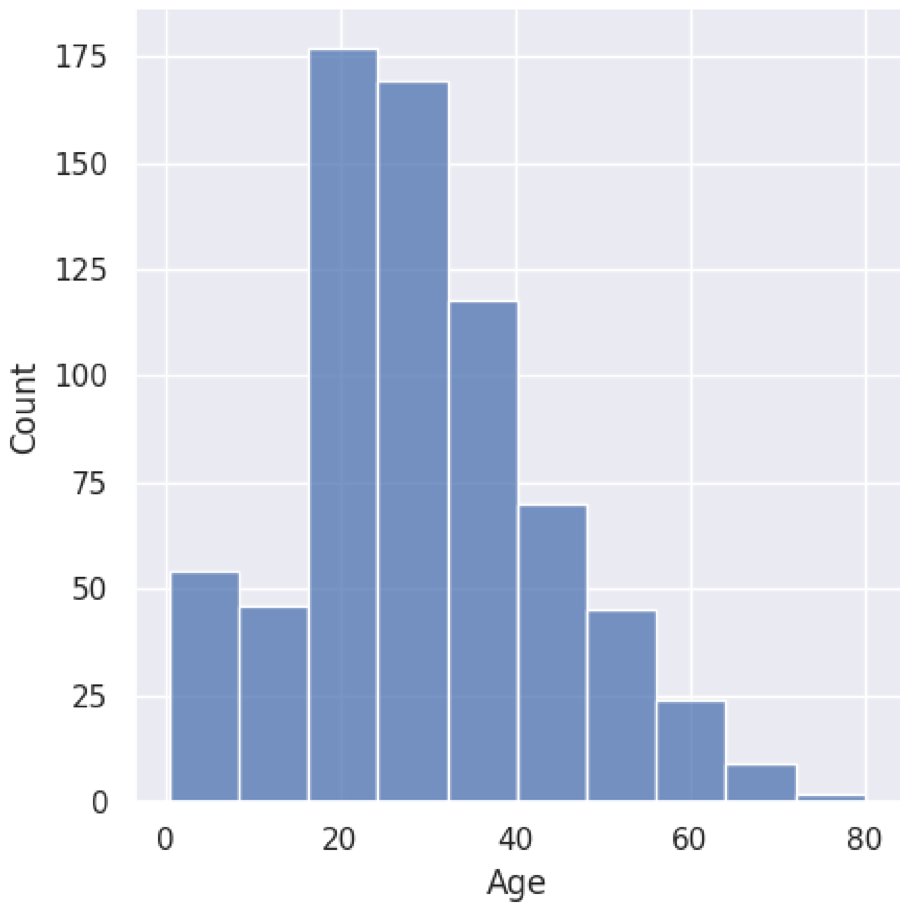
```
[ ]: sns.set(font_scale=1)
     g = sns.catplot(x="Sex", y="Survived", col="Pclass",
                         data=titanic_df, saturation=.5,
                         kind="bar", errorbar=None, aspect=.6)
     (g.set_axis_labels("", "Survival Rate")
         .set_xticklabels(["Men", "Women"])
         .set_titles("{col_name} {col_var}")
         .set(ylim=(0, 1))
         .despine(left=True))
     plt.subplots_adjust(top=0.8)
     g.fig.suptitle('How many Men and Women Survived by Passenger Class');
```



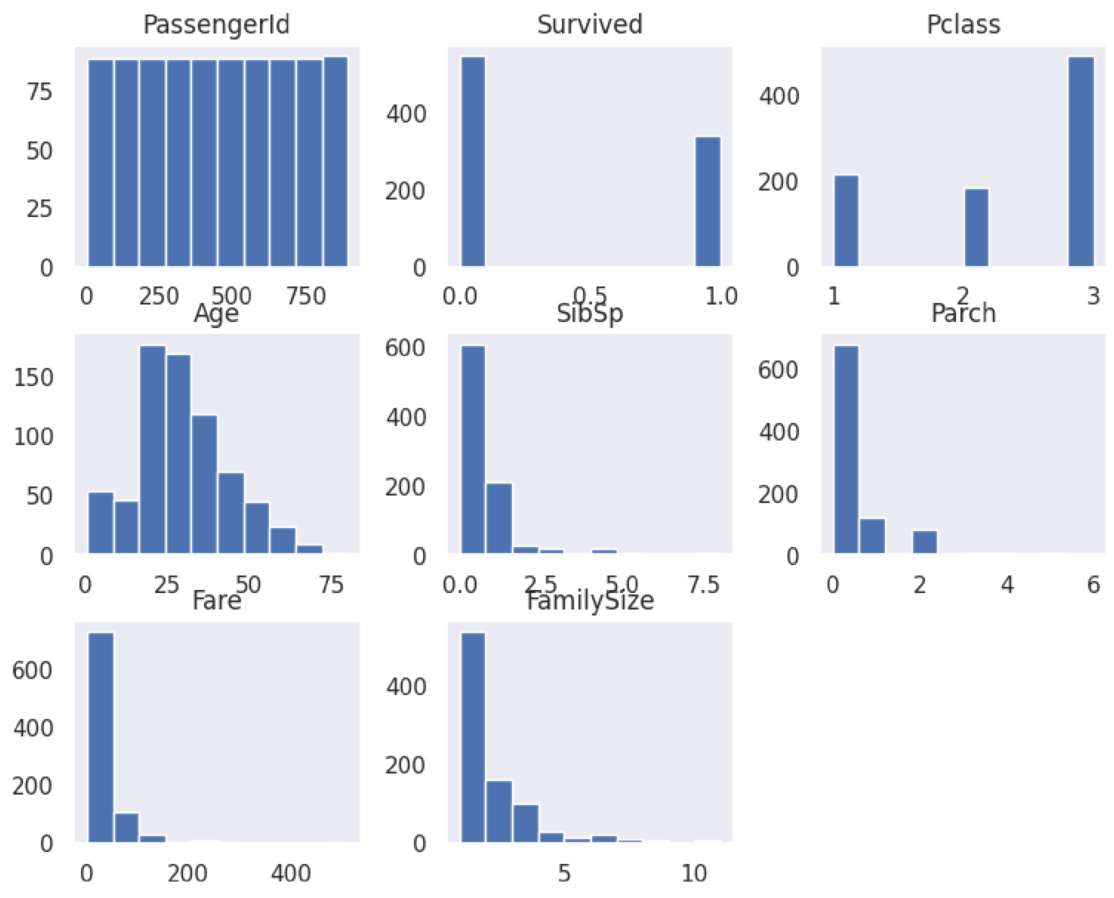
4.2 Variables Cuantitativas

```
[ ]: # set the size of the figure
     sns.set(rc={'figure.figsize':(11.7,8.27)})

     # plot a histogram showing the distribution of the target values
     sns.displot(titanic_df['Age'], bins=10)
     plt.show()
```

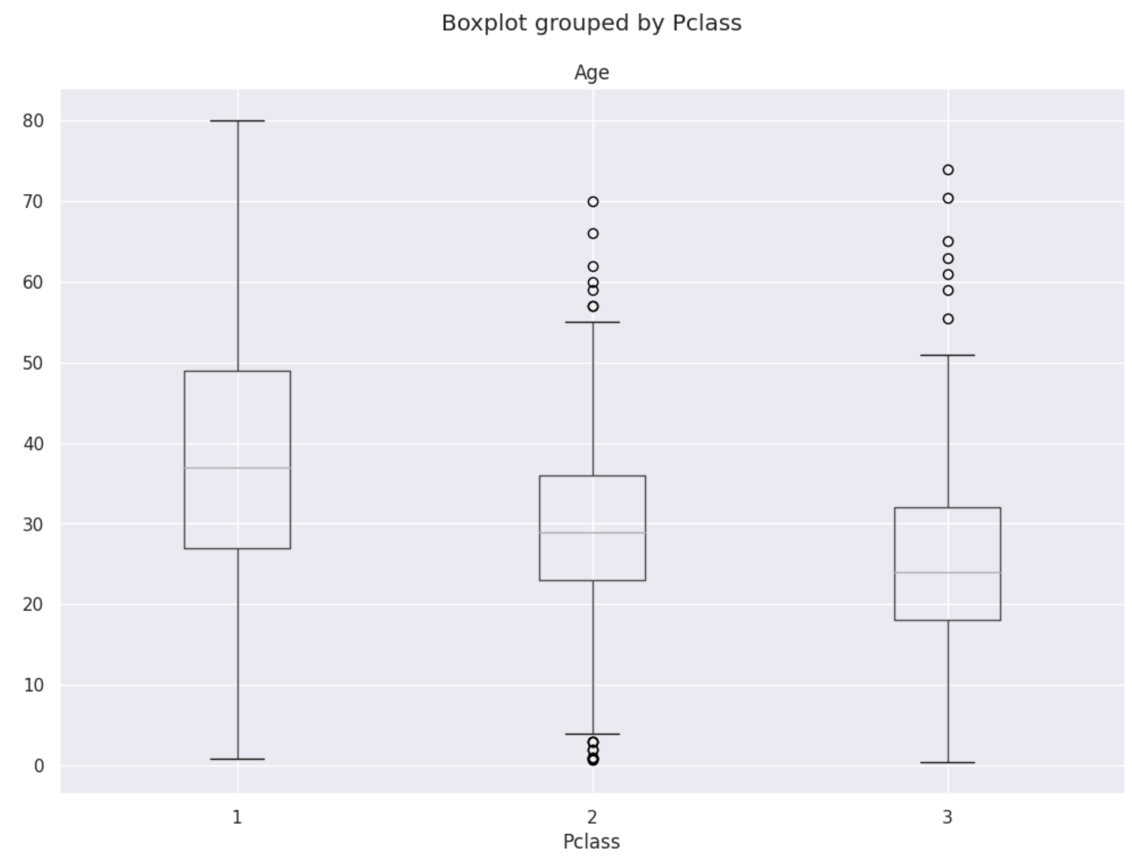


```
[ ]: titanic_df.hist(bins=10,figsize=(9,7),grid=False);
```

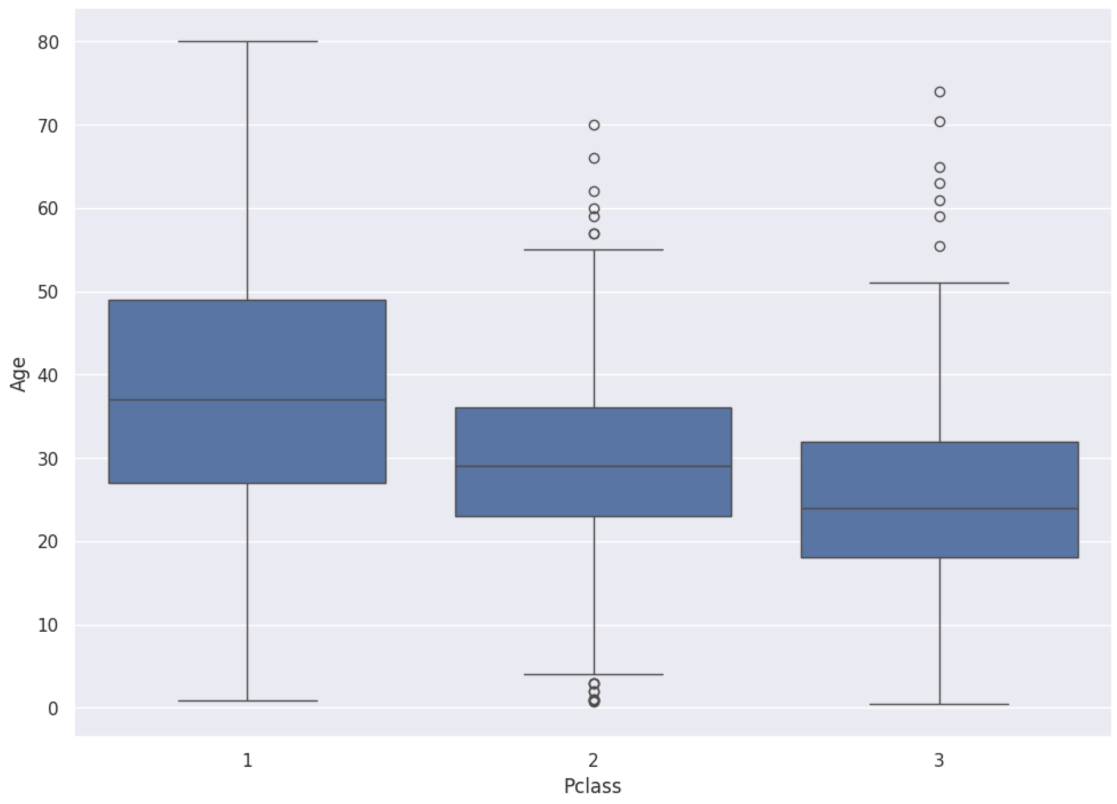


```
[ ]: titanic_df.boxplot(column='Age', by='Pclass') #Poner el by POS nos va a dar una␣
     ↪caja apra cada uno
```

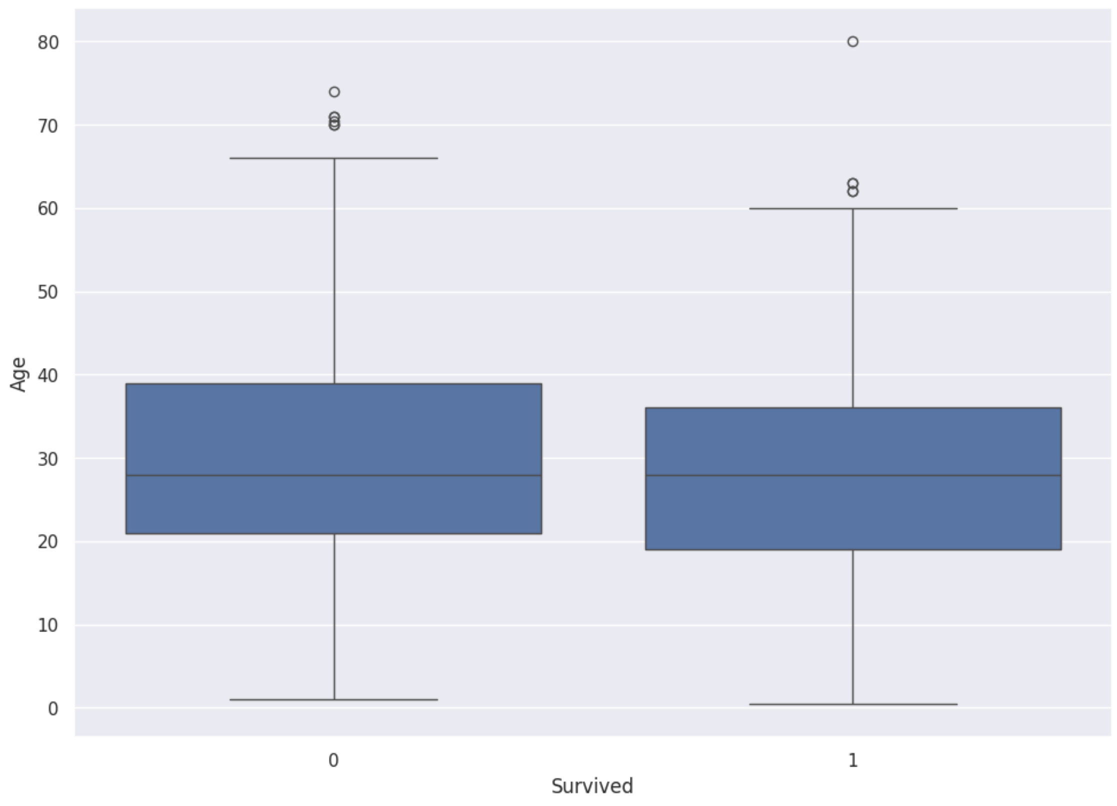
```
[ ]: <Axes: title={'center': 'Age'}, xlabel='Pclass'>
```



```
[ ]: ax = sns.boxplot(x="Pclass", y="Age",
                     data=titanic_df)
```

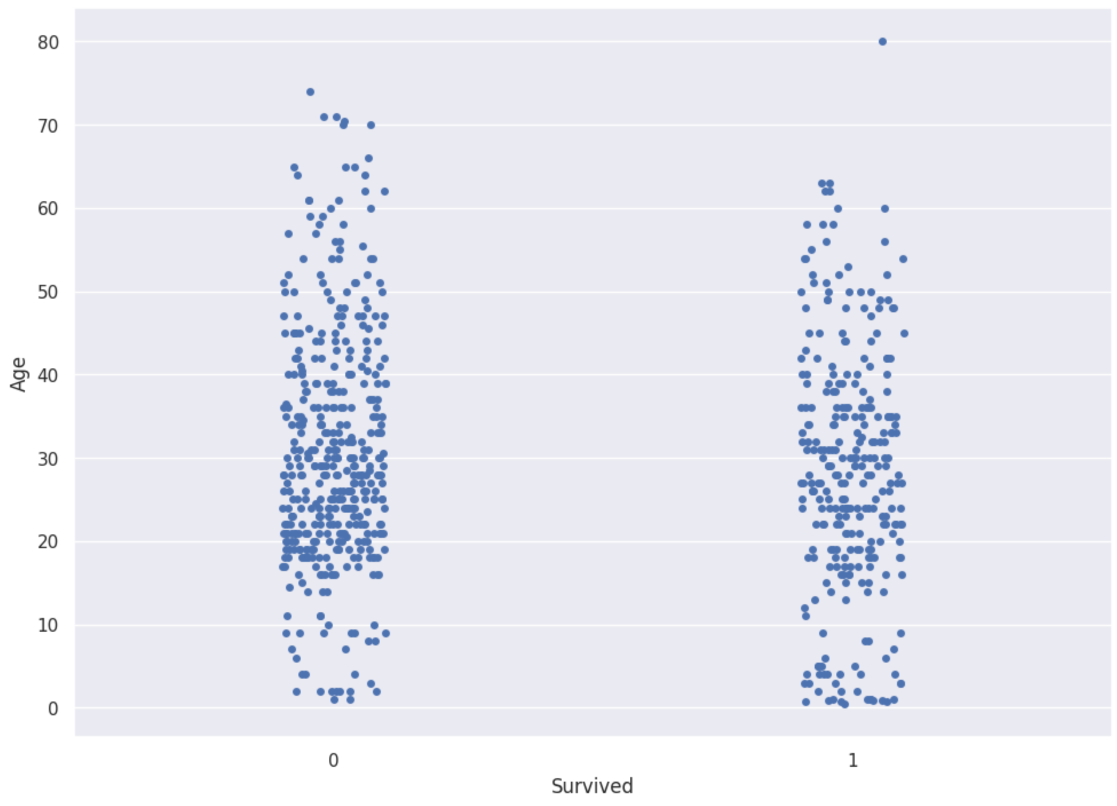


```
[ ]: ax = sns.boxplot(x="Survived", y="Age",
                     data=titanic_df)
```



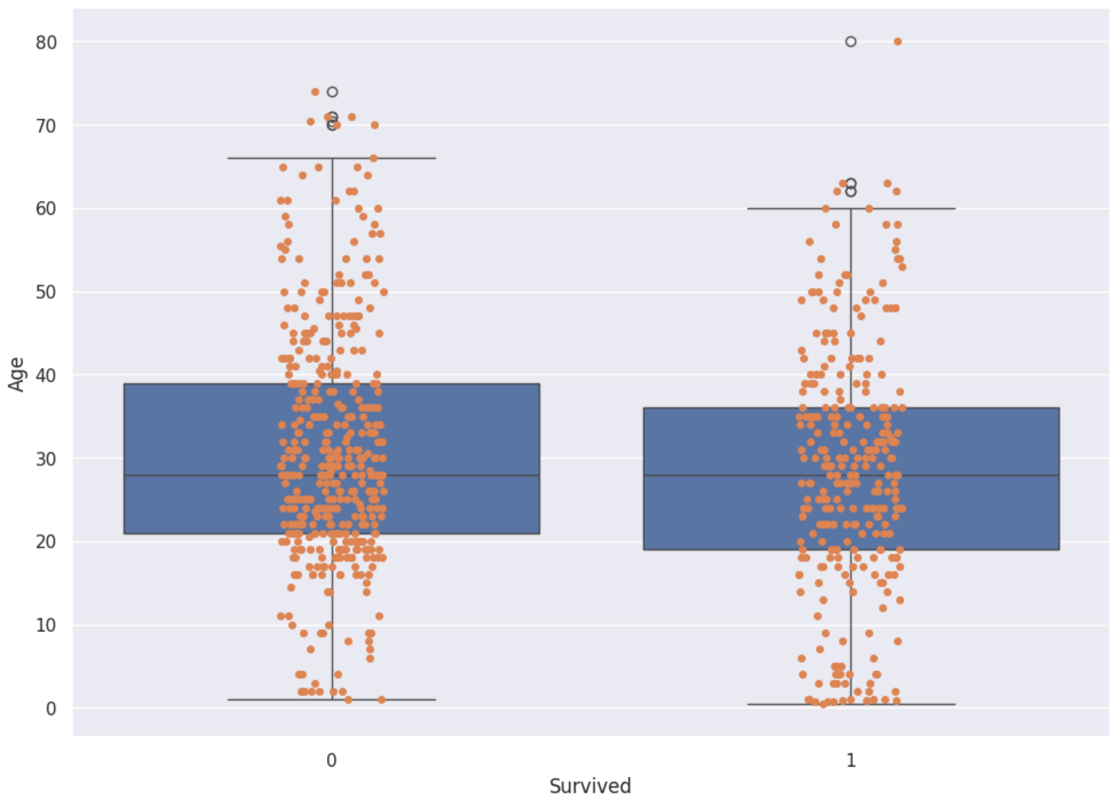
```
[ ]: ax = sns.stripplot(x="Survived", y="Age",
                        data=titanic_df, jitter=True,
                        edgecolor="gray")
```

```
<ipython-input-78-2e1af0adcf56>:1: FutureWarning: Use "auto" to set automatic
grayscale colors. From v0.14.0, "gray" will default to matplotlib's definition.
  ax = sns.stripplot(x="Survived", y="Age",
```



```
[ ]: ax = sns.boxplot(x="Survived", y="Age",
                     data=titanic_df)
     ax = sns.stripplot(x="Survived", y="Age",
                        data=titanic_df, jitter=True,
                        edgecolor="gray")
```

```
<ipython-input-79-c28953f888ad>:3: FutureWarning: Use "auto" to set automatic
grayscale colors. From v0.14.0, "gray" will default to matplotlib's definition.
  ax = sns.stripplot(x="Survived", y="Age",
```



La mayoría de los tripulantes entre 60 y 70 no sobrevivieron

```
[ ]: titanic_df.corr(method='pearson')
```

```
<ipython-input-80-31f18b9cd624>:1: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it will
default to False. Select only valid columns or specify the value of numeric_only
to silence this warning.
  titanic_df.corr(method='pearson')
```

```
[ ]:              PassengerId  Survived    Pclass       Age     SibSp     Parch  \
     PassengerId     1.000000 -0.005007 -0.035144  0.036847 -0.057527 -0.001652
     Survived       -0.005007  1.000000 -0.338481 -0.077221 -0.035322  0.081629
     Pclass         -0.035144 -0.338481  1.000000 -0.369226  0.083081  0.018443
     Age             0.036847 -0.077221 -0.369226  1.000000 -0.308247 -0.189119
     SibSp          -0.057527 -0.035322  0.083081 -0.308247  1.000000  0.414838
     Parch          -0.001652  0.081629  0.018443 -0.189119  0.414838  1.000000
     Fare            0.012658  0.257307 -0.549500  0.096067  0.159651  0.216225
     FamilySize     -0.040143  0.016639  0.065997 -0.301914  0.890712  0.783111

                      Fare  FamilySize
     PassengerId  0.012658   -0.040143
```

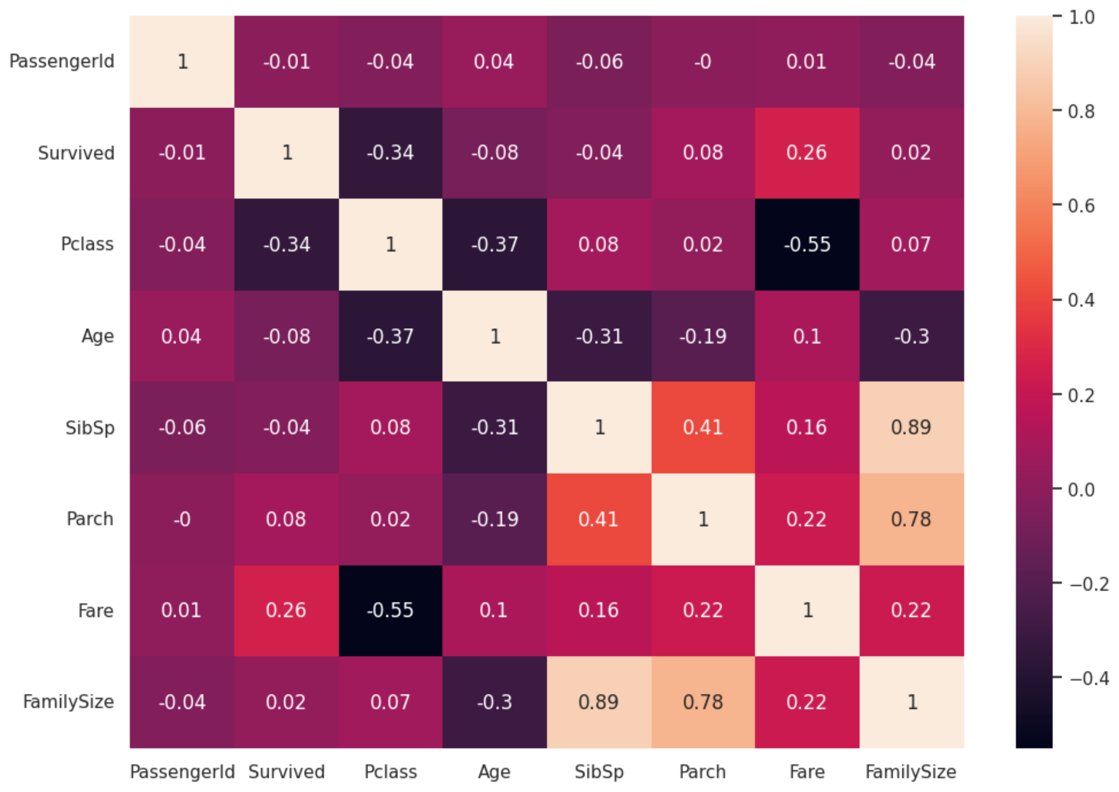
```
Survived      0.257307    0.016639
Pclass       -0.549500    0.065997
Age           0.096067   -0.301914
SibSp         0.159651    0.890712
Parch         0.216225    0.783111
Fare          1.000000    0.217138
FamilySize    0.217138    1.000000
```

[ ]:
```
correlation_matrix = titanic_df.corr().round(2)
```

```
<ipython-input-81-4fb6b5cc4793>:1: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it will
default to False. Select only valid columns or specify the value of numeric_only
to silence this warning.
  correlation_matrix = titanic_df.corr().round(2)
```

[ ]:
```
# use the heatmap function from seaborn to plot the correlation matrix
# annot = True to print the values inside the square
sns.heatmap(data=correlation_matrix, annot=True)
```

[ ]: `<Axes: >`



	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare	FamilySize
PassengerId	1	-0.01	-0.04	0.04	-0.06	-0	0.01	-0.04
Survived	-0.01	1	-0.34	-0.08	-0.04	0.08	0.26	0.02
Pclass	-0.04	-0.34	1	-0.37	0.08	0.02	-0.55	0.07
Age	0.04	-0.08	-0.37	1	-0.31	-0.19	0.1	-0.3
SibSp	-0.06	-0.04	0.08	-0.31	1	0.41	0.16	0.89
Parch	-0	0.08	0.02	-0.19	0.41	1	0.22	0.78
Fare	0.01	0.26	-0.55	0.1	0.16	0.22	1	0.22
FamilySize	-0.04	0.02	0.07	-0.3	0.89	0.78	0.22	1

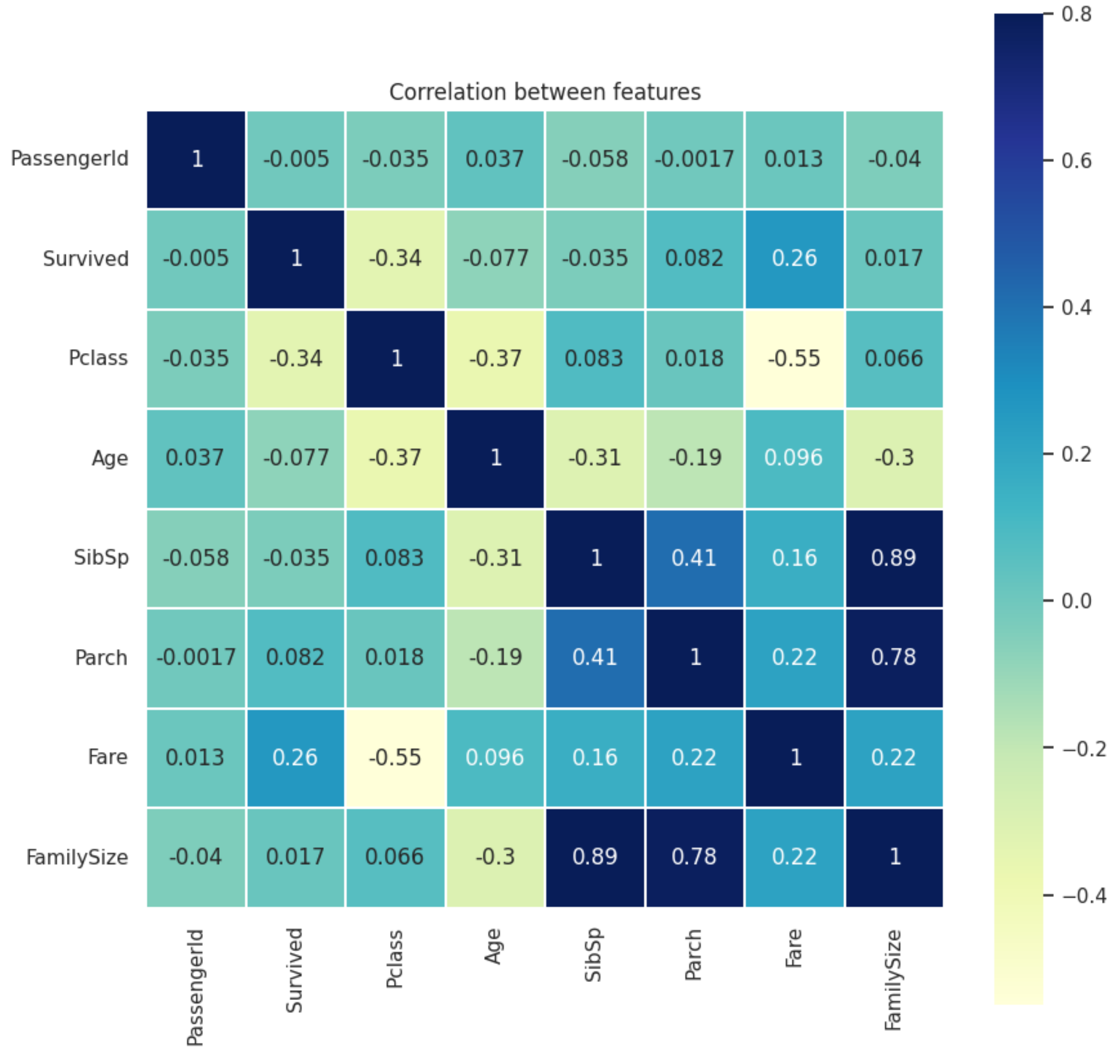
Correlación negativa entre clase y tarifa, A mayor valor de clase (ej. 3a. clase), menor tarifa.

Correlación negativa entre edad y clase, A mayor edad, menor valor de clase (1a. clase)
Correlación positiva entre tarifa y sobrevivencia, A mayor tarifa, mayor sobrevivencia

[ ]:
```
corr=titanic_df.corr()#["Survived"]
plt.figure(figsize=(10, 10))

sns.heatmap(corr, vmax=.8, linewidths=0.01,
            square=True,annot=True,cmap='YlGnBu',linecolor="white")
plt.title('Correlation between features');
```

```
<ipython-input-83-f1593d5b5bad>:1: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it will
default to False. Select only valid columns or specify the value of numeric_only
to silence this warning.
  corr=titanic_df.corr()#["Survived"]
```



	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare	FamilySize
PassengerId	1	-0.005	-0.035	0.037	-0.058	-0.0017	0.013	-0.04
Survived	-0.005	1	-0.34	-0.077	-0.035	0.082	0.26	0.017
Pclass	-0.035	-0.34	1	-0.37	0.083	0.018	-0.55	0.066
Age	0.037	-0.077	-0.37	1	-0.31	-0.19	0.096	-0.3
SibSp	-0.058	-0.035	0.083	-0.31	1	0.41	0.16	0.89
Parch	-0.0017	0.082	0.018	-0.19	0.41	1	0.22	0.78
Fare	0.013	0.26	-0.55	0.096	0.16	0.22	1	0.22
FamilySize	-0.04	0.017	0.066	-0.3	0.89	0.78	0.22	1

Se aprecia que Pclass tiene la más alta correlación negativa con “Survived” Existe cierta correlación también con Fare, Parch y Age.

4.3 Consulta

Crea un subconjunto de **titanic** para el costo mayor a 250

```
[ ]: # identifica los titanic con costo mayor a 250
     titanic_df.Fare>250
```

```
[ ]: 0      False
     1      False
     2      False
     3      False
     4      False
            …
     886    False
     887    False
     888    False
     889    False
     890    False
     Name: Fare, Length: 891, dtype: bool
```

```
[ ]: # usa el criterio para extraer solo los boletos caros
     tripulantes_tarifas_caras = titanic_df[titanic_df.Fare >= 250]
     tripulantes_tarifas_caras
```

```
[ ]:      PassengerId  Survived  Pclass                                Name  \
     27            28         0       1         Fortune, Mr. Charles Alexander
     88            89         1       1             Fortune, Miss. Mabel Helen
     258          259         1       1                       Ward, Miss. Anna
     311          312         1       1             Ryerson, Miss. Emily Borie
     341          342         1       1         Fortune, Miss. Alice Elizabeth
     438          439         0       1                      Fortune, Mr. Mark
     679          680         1       1     Cardeza, Mr. Thomas Drake Martinez
     737          738         1       1                 Lesurer, Mr. Gustave J
     742          743         1       1  Ryerson, Miss. Susan Parker "Suzette"

             Sex   Age  SibSp  Parch    Ticket      Fare            Cabin Embarked  \
     27     male  19.0      3      2     19950  263.0000      C23 C25 C27        S
     88   female  23.0      3      2     19950  263.0000      C23 C25 C27        S
     258  female  35.0      0      0  PC 17755  512.3292              NaN        C
     311  female  18.0      2      2  PC 17608  262.3750  B57 B59 B63 B66        C
     341  female  24.0      3      2     19950  263.0000      C23 C25 C27        S
     438    male  64.0      1      4     19950  263.0000      C23 C25 C27        S
     679    male  36.0      0      1  PC 17755  512.3292      B51 B53 B55        C
     737    male  35.0      0      0  PC 17755  512.3292             B101        C
     742  female  21.0      2      2  PC 17608  262.3750  B57 B59 B63 B66        C
     FamilySize
27            6
88            6
258           1
311           5
341           6
438           6
679           2
737           1
742           5
```

4.4 Operaciones de ordenamiento

```
[ ]: # ordenar por etiquetas de renglón
     tripulantes_tarifas_caras.sort_values('Name')
```

```
[ ]:      PassengerId  Survived  Pclass                                  Name  \
     679          680         1       1     Cardeza, Mr. Thomas Drake Martinez
     341          342         1       1         Fortune, Miss. Alice Elizabeth
     88            89         1       1             Fortune, Miss. Mabel Helen
     27            28         0       1         Fortune, Mr. Charles Alexander
     438          439         0       1                     Fortune, Mr. Mark
     737          738         1       1                 Lesurer, Mr. Gustave J
     311          312         1       1             Ryerson, Miss. Emily Borie
     742          743         1       1  Ryerson, Miss. Susan Parker "Suzette"
     258          259         1       1                     Ward, Miss. Anna

             Sex   Age  SibSp  Parch    Ticket      Fare            Cabin Embarked  \
     679    male  36.0      0      1  PC 17755  512.3292      B51 B53 B55        C
     341  female  24.0      3      2     19950  263.0000      C23 C25 C27        S
     88   female  23.0      3      2     19950  263.0000      C23 C25 C27        S
     27     male  19.0      3      2     19950  263.0000      C23 C25 C27        S
     438    male  64.0      1      4     19950  263.0000      C23 C25 C27        S
     737    male  35.0      0      0  PC 17755  512.3292             B101        C
     311  female  18.0      2      2  PC 17608  262.3750  B57 B59 B63 B66        C
     742  female  21.0      2      2  PC 17608  262.3750  B57 B59 B63 B66        C
     258  female  35.0      0      0  PC 17755  512.3292              NaN        C

          FamilySize
     679           2
     341           6
     88            6
     27            6
     438           6
     737           1
     311           5
```

```
742            5
258            1
```

[ ]:
```
# ordenar por valores de columna usando "order field"
tripulantes_tarifas_caras.sort_values('Age',ascending=False)
```

[ ]:
```
     PassengerId  Survived  Pclass                                Name  \
438          439         0       1                   Fortune, Mr. Mark
679          680         1       1  Cardeza, Mr. Thomas Drake Martinez
258          259         1       1                    Ward, Miss. Anna
737          738         1       1              Lesurer, Mr. Gustave J
341          342         1       1      Fortune, Miss. Alice Elizabeth
88            89         1       1          Fortune, Miss. Mabel Helen
742          743         1       1   Ryerson, Miss. Susan Parker "Suzette"
27            28         0       1      Fortune, Mr. Charles Alexander
311          312         1       1          Ryerson, Miss. Emily Borie

        Sex   Age  SibSp  Parch    Ticket      Fare        Cabin Embarked  \
438    male  64.0      1      4     19950  263.0000  C23 C25 C27        S
679    male  36.0      0      1  PC 17755  512.3292  B51 B53 B55        C
258  female  35.0      0      0  PC 17755  512.3292          NaN        C
737    male  35.0      0      0  PC 17755  512.3292         B101        C
341  female  24.0      3      2     19950  263.0000  C23 C25 C27        S
88   female  23.0      3      2     19950  263.0000  C23 C25 C27        S
742  female  21.0      2      2  PC 17608  262.3750  B57 B59 B63 B66        C
27     male  19.0      3      2     19950  263.0000  C23 C25 C27        S
311  female  18.0      2      2  PC 17608  262.3750  B57 B59 B63 B66        C

     FamilySize
438           6
679           2
258           1
737           1
341           6
88            6
742           5
27            6
311           5
```

[ ]:
```
# top 5 de Edad
top10 = tripulantes_tarifas_caras.sort_values('Fare',ascending=False).head()
top10
```

[ ]:
```
     PassengerId  Survived  Pclass                                Name  \
258          259         1       1                    Ward, Miss. Anna
679          680         1       1  Cardeza, Mr. Thomas Drake Martinez
737          738         1       1              Lesurer, Mr. Gustave J
```

```
27            28          0       1      Fortune, Mr. Charles Alexander
88            89          1       1          Fortune, Miss. Mabel Helen

        Sex   Age  SibSp  Parch    Ticket      Fare        Cabin Embarked  \
258  female  35.0      0      0  PC 17755  512.3292          NaN        C
679    male  36.0      0      1  PC 17755  512.3292  B51 B53 B55        C
737    male  35.0      0      0  PC 17755  512.3292         B101        C
27     male  19.0      3      2     19950  263.0000  C23 C25 C27        S
88   female  23.0      3      2     19950  263.0000  C23 C25 C27        S

     FamilySize
258           1
679           2
737           1
27            6
88            6
```

Resumen de lo aprendido

En esta practica aprendi a obtener descripciones estadisticas de variables con pandas y numpy. La diferencia entre variables categoricas y númericas y como analizarlas.

De igual manera como crear distintos tipos de graficas con los datos guardados en un dataframe, asi como datos que se estan modificando para aparecer en la grafica.

De igual manera como obtener matrices de confusión de distintas variables y graficarlas.