In [2]:
```
import pandas as pd
```

In [4]:
```
titanic_data=pd.read_csv("Titanic-Dataset.csv")
titanic_data
```

Out[4]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fa
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.250
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.283
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.925
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.100
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.050
...	...	...	...	...	...	...	...	...	...	
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.000
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.000
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.450
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.000
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.750

891 rows × 12 columns

In [3]:
```
titanic_data.shape
```

Out[3]:
```
(891, 12)
```

In [4]:
```
titanic_data.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
```

In [5]:
```
titanic_data.describe()
```

Out[5]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057	49.693429
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	223.500000	0.000000	2.000000	20.125000	0.000000	0.000000	7.910400
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000	14.454200
75%	668.500000	1.000000	3.000000	38.000000	1.000000	0.000000	31.000000
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

In [6]:
```
titanic_data.columns
```

Out[6]:
```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
      dtype='object')
```

In [7]:
```
titanic_data.isnull().any() #three columns has null values those are : Age,(
```

Out[7]:
```
PassengerId    False
Survived       False
Pclass         False
Name           False
Sex            False
Age             True
SibSp          False
Parch          False
Ticket         False
Fare           False
Cabin           True
Embarked        True
dtype: bool
```

Handling missing values in Age Column

In [8]:
```
titanic_data['Age'].isna().sum() #177 values
```

Out[8]:
```
177
```

In [9]:
```
titanic_data['Age']
```

Out[9]:
```
0      22.0
1      38.0
2      26.0
3      35.0
4      35.0
       ...
886    27.0
887    19.0
888     NaN
889    26.0
890    32.0
Name: Age, Length: 891, dtype: float64
```

Using Predictive imputation for handling the missing values in the Age column

In [10]:
```
titanic_data['Age'].unique() #Age is in  float??? but should be int cause i
```

Out[10]:
```
array([22.  , 38.  , 26.  , 35.  ,   nan, 54.  ,  2.  , 27.  , 14.  ,
        4.  , 58.  , 20.  , 39.  , 55.  , 31.  , 34.  , 15.  , 28.  ,
        8.  , 19.  , 40.  , 66.  , 42.  , 21.  , 18.  ,  3.  ,  7.  ,
       49.  , 29.  , 65.  , 28.5 ,  5.  , 11.  , 45.  , 17.  , 32.  ,
       16.  , 25.  ,  0.83, 30.  , 33.  , 23.  , 24.  , 46.  , 59.  ,
       71.  , 37.  , 47.  , 14.5 , 70.5 , 32.5 , 12.  ,  9.  , 36.5 ,
       51.  , 55.5 , 40.5 , 44.  ,  1.  , 61.  , 56.  , 50.  , 36.  ,
       45.5 , 20.5 , 62.  , 41.  , 52.  , 63.  , 23.5 ,  0.92, 43.  ,
       60.  , 10.  , 64.  , 13.  , 48.  ,  0.75, 53.  , 57.  , 80.  ,
       70.  , 24.5 ,  6.  ,  0.67, 30.5 ,  0.42, 34.5 , 74.  ])
```

In [11]:
```
from sklearn.ensemble import RandomForestRegressor
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error

# Check data types of all columns
print(titanic_data.dtypes)

# Prepare the data: Drop rows with missing age values and convert categorica
# For simplicity, let's drop 'Cabin' and 'Embarked' columns for now
titanic_data_temp = titanic_data.drop(['Cabin', 'Embarked'], axis=1)

# Check for non-numeric values
print(titanic_data_temp.select_dtypes(include=['object']).columns)

# It seems like 'Sex' column contains non-numeric values. Let's encode it.
titanic_data_temp = pd.get_dummies(titanic_data_temp, columns=['Sex'])

# Split the data into features (X) and target variable (y)
X = titanic_data_temp.drop(['Age', 'Name', 'Ticket'], axis=1)
y = titanic_data_temp['Age']

# Split the dataset into training and test sets
X_train, X_test = X[~y.isnull()], X[y.isnull()]
y_train = y[~y.isnull()]

# Train the model
model = RandomForestRegressor(random_state=42)
model.fit(X_train, y_train)

# Predict missing ages
predicted_ages = model.predict(X_test)

# Impute missing values
titanic_data.loc[titanic_data['Age'].isnull(), 'Age'] = predicted_ages
```

```
PassengerId      int64
Survived         int64
Pclass           int64
Name            object
Sex             object
Age            float64
SibSp            int64
Parch            int64
Ticket          object
Fare           float64
Cabin           object
Embarked        object
dtype: object
Index(['Name', 'Sex', 'Ticket'], dtype='object')
```

In [12]:
```
titanic_data['Age'].isna().sum() #cleared missing values
```

Out[12]:
```
0
```

In [13]:
```
titanic_data['Age'] = titanic_data['Age'].astype(int)
```

In [62]:
```
titanic_data['Age']
```

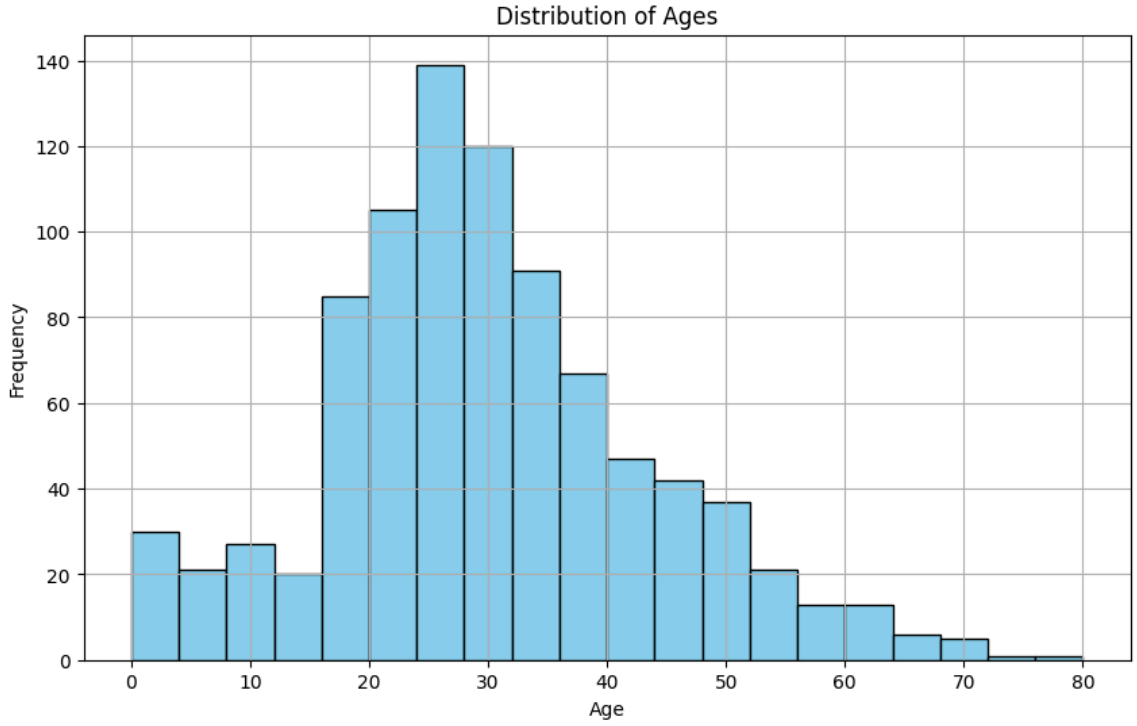
Out[62]:
```
0      22
1      38
2      26
3      35
4      35
       ..
886    27
887    19
888    23
889    26
890    32
Name: Age, Length: 891, dtype: int64
```

In [14]:
```
titanic_data.sample(7)
```

Out[14]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	
429	430	1	3	Pickard, Mr. Berk (Berk Trembisky)	male	32	0	0	SOTON/O.Q. 392078	8
17	18	1	2	Williams, Mr. Charles Eugene	male	44	0	0	244373	13
851	852	0	3	Svensson, Mr. Johan	male	74	0	0	347060	7
343	344	0	2	Sedgwick, Mr. Charles Frederick Waddington	male	25	0	0	244361	13
458	459	1	2	Toomey, Miss. Ellen	female	50	0	0	F.C.C. 13531	10
576	577	1	2	Garside, Miss. Ethel	female	34	0	0	243880	13
11	12	1	1	Bonnell, Miss. Elizabeth	female	58	0	0	113783	26

In [15]:
```
import matplotlib.pyplot as plt

# Create histogram
plt.figure(figsize=(10, 6))
plt.hist(titanic_data['Age'], bins=20, color='skyblue', edgecolor='black')
plt.title('Distribution of Ages')
plt.xlabel('Age')
plt.ylabel('Frequency')
plt.grid(True)
plt.show()
```



In [16]:
```
titanic_data['Age'].value_counts()
```

Out[16]:
```
Age
24    45
30    41
25    38
28    35
22    32
      ..
53     2
57     2
66     1
80     1
74     1
Name: count, Length: 71, dtype: int64
```

Handling missing values in Cabin Column

In [17]:
```
titanic_data['Cabin'].isna().sum() #687 values
```

Out[17]:
```
687
```

In [18]:
```
titanic_data['Cabin']
```

Out[18]:
```
0       NaN
1       C85
2       NaN
3      C123
4       NaN
       ...
886     NaN
887     B42
888     NaN
889    C148
890     NaN
Name: Cabin, Length: 891, dtype: object
```

In [19]:
```
# Fill missing values in 'Cabin' column with the mode
mode_cabin = titanic_data['Cabin'].mode()[0]
titanic_data['Cabin'].fillna(mode_cabin, inplace=True)
```

In [20]:
```
titanic_data['Cabin'].isna().sum()
```

Out[20]:
```
0
```

In [21]:
```
titanic_data.sample(3)
```

Out[21]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare
160	161	0	3	Cribb, Mr. John Hatfield	male	44	0	1	371362	16.1000
467	468	0	1	Smart, Mr. John Montgomery	male	56	0	0	113792	26.5500
9	10	1	2	Nasser, Mrs. Nicholas (Adele Achem)	female	14	1	0	237736	30.0708

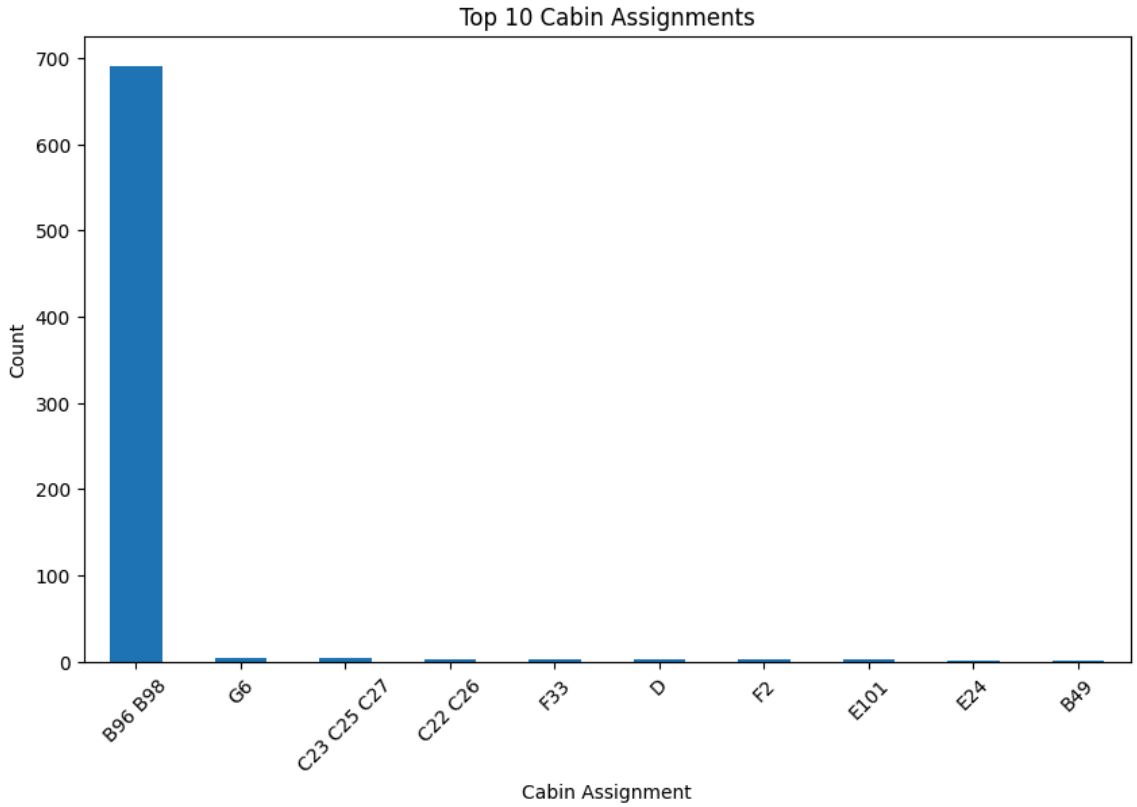
In [22]:
```
titanic_data['Cabin'].unique()
```

Out[22]:
```
array(['B96 B98', 'C85', 'C123', 'E46', 'G6', 'C103', 'D56', 'A6',
       'C23 C25 C27', 'B78', 'D33', 'B30', 'C52', 'B28', 'C83', 'F33',
       'F G73', 'E31', 'A5', 'D10 D12', 'D26', 'C110', 'B58 B60', 'E101',
       'F E69', 'D47', 'B86', 'F2', 'C2', 'E33', 'B19', 'A7', 'C49', 'F4',
       'A32', 'B4', 'B80', 'A31', 'D36', 'D15', 'C93', 'C78', 'D35',
       'C87', 'B77', 'E67', 'B94', 'C125', 'C99', 'C118', 'D7', 'A19',
       'B49', 'D', 'C22 C26', 'C106', 'C65', 'E36', 'C54',
       'B57 B59 B63 B66', 'C7', 'E34', 'C32', 'B18', 'C124', 'C91', 'E40',
       'T', 'C128', 'D37', 'B35', 'E50', 'C82', 'E10', 'E44', 'A34',
       'C104', 'C111', 'C92', 'E38', 'D21', 'E12', 'E63', 'A14', 'B37',
       'C30', 'D20', 'B79', 'E25', 'D46', 'B73', 'C95', 'B38', 'B39',
       'B22', 'C86', 'C70', 'A16', 'C101', 'C68', 'A10', 'E68', 'B41',
       'A20', 'D19', 'D50', 'D9', 'A23', 'B50', 'A26', 'D48', 'E58',
       'C126', 'B71', 'B51 B53 B55', 'D49', 'B5', 'B20', 'F G63',
       'C62 C64', 'E24', 'C90', 'C45', 'E8', 'B101', 'D45', 'C46', 'D30',
       'E121', 'D11', 'E77', 'F38', 'B3', 'D6', 'B82 B84', 'D17', 'A36',
       'B102', 'B69', 'E49', 'C47', 'D28', 'E17', 'A24', 'C50', 'B42',
       'C148'], dtype=object)
```

In [63]:
```
titanic_data['Cabin']
```

Out[63]:
```
0      B96 B98
1          C85
2      B96 B98
3         C123
4      B96 B98
        ...
886    B96 B98
887        B42
888    B96 B98
889       C148
890    B96 B98
Name: Cabin, Length: 891, dtype: object
```

In [23]:
```
import matplotlib.pyplot as plt

# Count the number of occurrences of each cabin assignment
cabin_value_count = titanic_data['Cabin'].value_counts().head(10)

# Plotting
plt.figure(figsize=(10, 6))
cabin_value_count.plot(kind='bar')
plt.xlabel('Cabin Assignment')
plt.ylabel('Count')
plt.title('Top 10 Cabin Assignments')
plt.xticks(rotation=45)
plt.show()
```



Handling Missing values in Embarked

In [24]:
```
titanic_data['Embarked'].isna().sum() # 2values
```

Out[24]:
```
2
```

In [25]:
```
titanic_data['Embarked'].unique()
```

Out[25]:
```
array(['S', 'C', 'Q', nan], dtype=object)
```

In [26]:
```
# Fill missing values in 'Embarked' column with the mode
mode_embarked = titanic_data['Embarked'].mode()[0]
titanic_data['Embarked'].fillna(mode_embarked, inplace=True)
```

In [27]:
```
titanic_data['Embarked'].isna().sum() #cleared the missing values
```

Out[27]:
```
0
```

Checking the Remaining columns in the dataset

PassengerId Column

In [28]:
```
titanic_data['PassengerId']
```

Out[28]:
```
0        1
1        2
2        3
3        4
4        5
      ...
886    887
887    888
888    889
889    890
890    891
Name: PassengerId, Length: 891, dtype: int64
```

In [29]:
```
titanic_data.shape
```

Out[29]:
```
(891, 12)
```

In [30]:
```
titanic_data['PassengerId'].nunique() #we have exact unique row numbers for
```

Out[30]:
```
891
```

```
# Survived Column
```

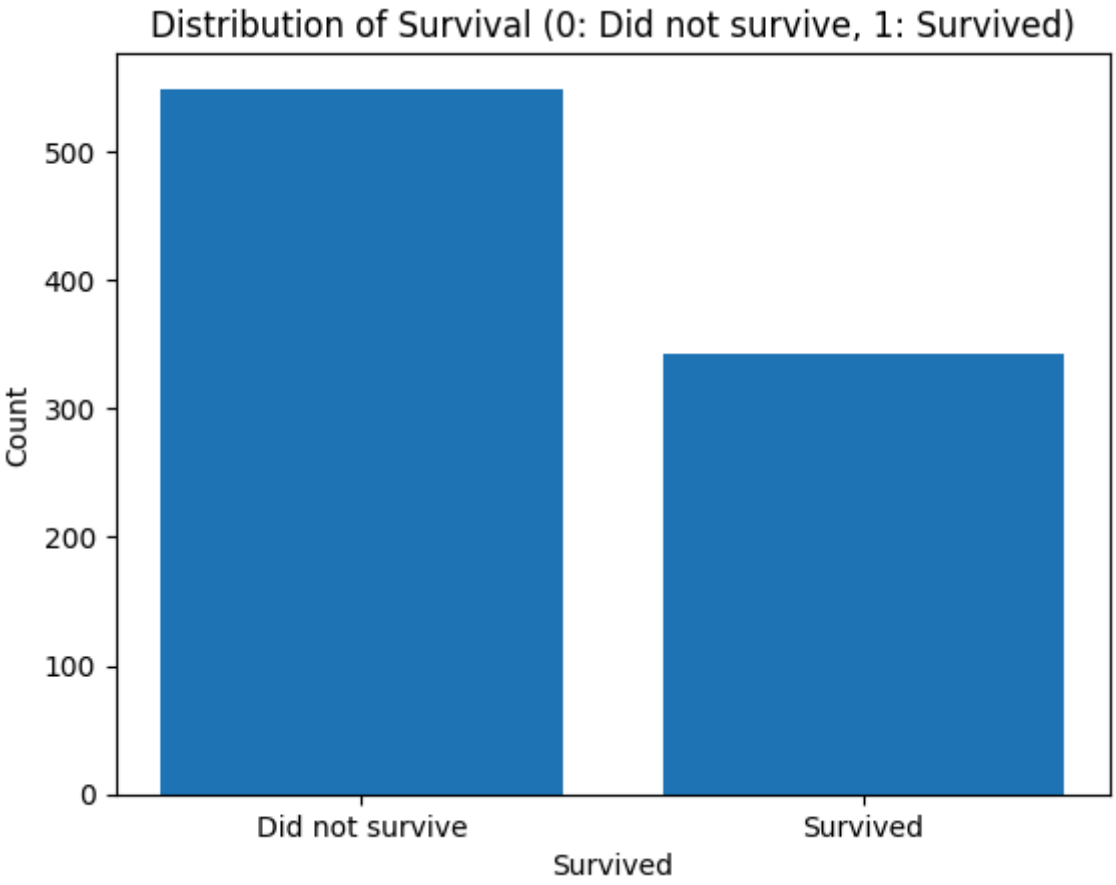
In [31]:
```
titanic_data['Survived']
```

Out[31]:
```
0      0
1      1
2      1
3      1
4      0
      ..
886    0
887    1
888    0
889    1
890    0
Name: Survived, Length: 891, dtype: int64
```

In [32]:
```
titanic_data['Survived'].unique()
```

Out[32]:
```
array([0, 1])
```

In [33]:
```
survived_distribution = titanic_data['Survived'].value_counts()

# Plotting the distribution
plt.bar(survived_distribution.index, survived_distribution.values)
plt.xlabel('Survived')
plt.ylabel('Count')
plt.title('Distribution of Survival (0: Did not survive, 1: Survived)')
plt.xticks([0, 1], ['Did not survive', 'Survived'])
plt.show()
```



Pclass Column

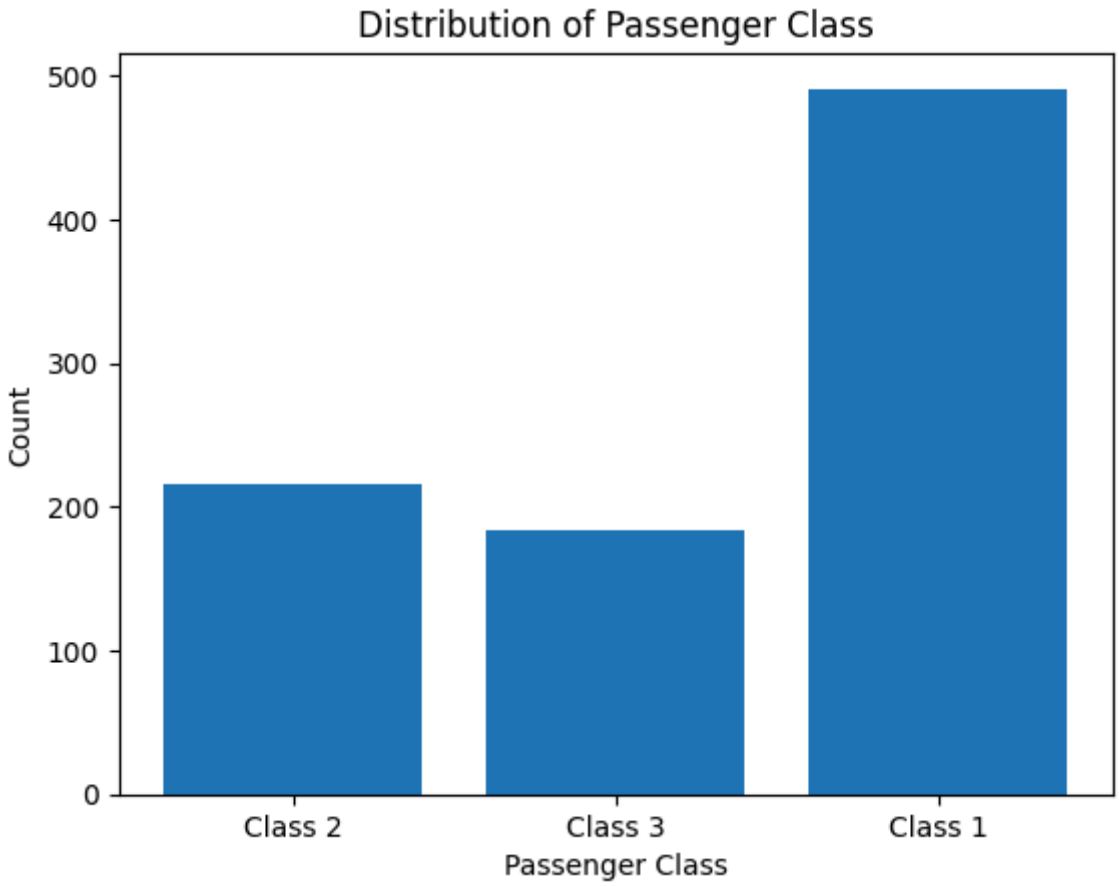
In [34]:
```
titanic_data['Pclass']
```

Out[34]:
```
0      3
1      1
2      3
3      1
4      3
      ..
886    2
887    1
888    3
889    1
890    3
Name: Pclass, Length: 891, dtype: int64
```

In [35]:
```
titanic_data['Pclass'].unique()
```

Out[35]:
```
array([3, 1, 2])
```

In [36]:
```
# Assuming titanic_data is your DataFrame containing the 'Pclass' column
pclass_distribution = titanic_data['Pclass'].value_counts()

# Plotting the distribution
plt.bar(pclass_distribution.index, pclass_distribution.values)
plt.xlabel('Passenger Class')
plt.ylabel('Count')
plt.title('Distribution of Passenger Class')
plt.xticks(pclass_distribution.index, ['Class 1', 'Class 2', 'Class 3'])
plt.show()
```



Name Column

In [37]:
```
titanic_data['Name']
```

Out[37]:
```
0                                Braund, Mr. Owen Harris
1      Cumings, Mrs. John Bradley (Florence Briggs Th...
2                                 Heikkinen, Miss. Laina
3           Futrelle, Mrs. Jacques Heath (Lily May Peel)
4                               Allen, Mr. William Henry
                              ...
886                                Montvila, Rev. Juozas
887                         Graham, Miss. Margaret Edith
888             Johnston, Miss. Catherine Helen "Carrie"
889                                Behr, Mr. Karl Howell
890                                  Dooley, Mr. Patrick
Name: Name, Length: 891, dtype: object
```

In [64]:
```
titanic_data['Name'].nunique()
```

Out[64]:
```
891
```

In [38]:
```
titanic_data['Name'].unique()
```

Out[38]:
```
array(['Braund, Mr. Owen Harris',
       'Cumings, Mrs. John Bradley (Florence Briggs Thayer)',
       'Heikkinen, Miss. Laina',
       'Futrelle, Mrs. Jacques Heath (Lily May Peel)',
       'Allen, Mr. William Henry', 'Moran, Mr. James',
       'McCarthy, Mr. Timothy J', 'Palsson, Master. Gosta Leonard',
       'Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)',
       'Nasser, Mrs. Nicholas (Adele Achem)',
       'Sandstrom, Miss. Marguerite Rut', 'Bonnell, Miss. Elizabeth',
       'Saundercock, Mr. William Henry', 'Andersson, Mr. Anders Johan',
       'Vestrom, Miss. Hulda Amanda Adolfina',
       'Hewlett, Mrs. (Mary D Kingcome) ', 'Rice, Master. Eugene',
       'Williams, Mr. Charles Eugene',
       'Vander Planke, Mrs. Julius (Emelia Maria Vandemoortele)',
       'Masselmani, Mrs. Fatima', 'Fynney, Mr. Joseph J',
       'Beesley, Mr. Lawrence', 'McGowan, Miss. Anna "Annie"',
       'Sloper, Mr. William Thompson', 'Palsson, Miss. Torborg Danira',
       'Asplund, Mrs. Carl Oscar (Selma Augusta Emilia Johansson)',
       'Emir, Mr. Farred Chehab', 'Fortune, Mr. Charles Alexander',
```

In [39]:
```
titanic_data['Name'].value_counts()
```

Out[39]:
```
Name
Braund, Mr. Owen Harris                     1
Boulos, Mr. Hanna                           1
Frolicher-Stehli, Mr. Maxmillian            1
Gilinski, Mr. Eliezer                       1
Murdlin, Mr. Joseph                         1
                                           ..
Kelly, Miss. Anna Katherine "Annie Kate"    1
McCoy, Mr. Bernard                          1
Johnson, Mr. William Cahoone Jr             1
Keane, Miss. Nora A                         1
Dooley, Mr. Patrick                         1
Name: count, Length: 891, dtype: int64
```

Sex Column

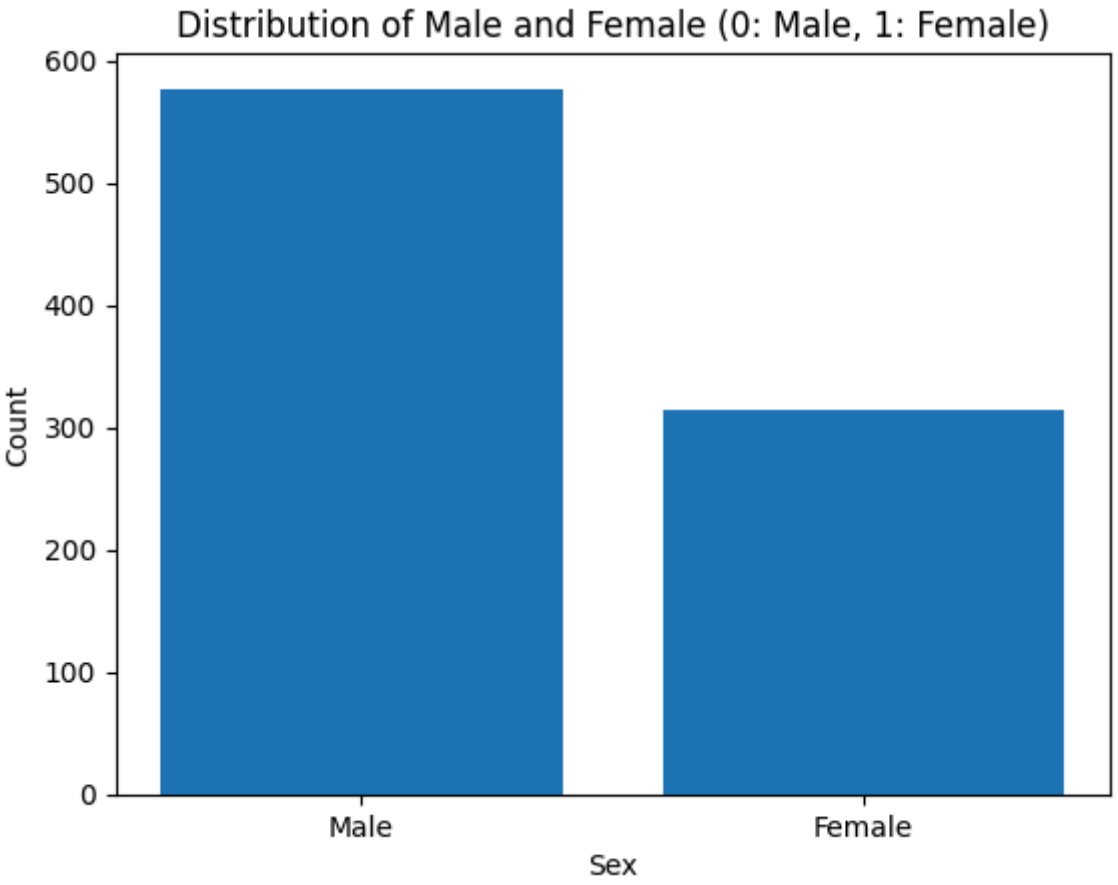
In [40]:
```
titanic_data['Sex']
```

Out[40]:
```
0        male
1      female
2      female
3      female
4        male
       ...
886      male
887    female
888    female
889      male
890      male
Name: Sex, Length: 891, dtype: object
```

In [41]:
```
titanic_data['Sex'].unique()
```

Out[41]:
```
array(['male', 'female'], dtype=object)
```

In [42]:
```
sex_distribution = titanic_data['Sex'].value_counts()

# Plotting the distribution
plt.bar(sex_distribution.index, sex_distribution.values)
plt.xlabel('Sex')
plt.ylabel('Count')
plt.title('Distribution of Male and Female (0: Male, 1: Female)')
plt.xticks([0, 1], ['Male', 'Female'])
plt.show()
```



SibSp Column

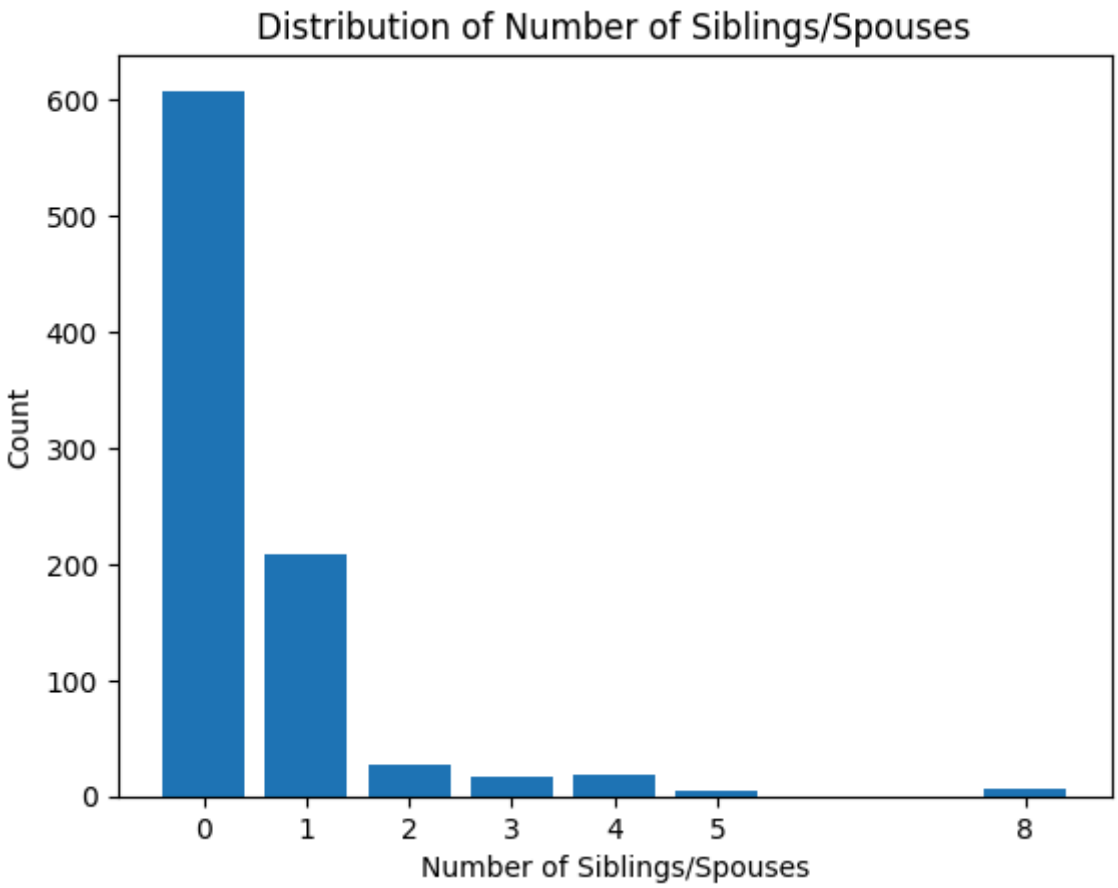
In [44]:
```
titanic_data['SibSp']
```

Out[44]:
```
0      1
1      1
2      0
3      1
4      0
      ..
886    0
887    0
888    1
889    0
890    0
Name: SibSp, Length: 891, dtype: int64
```

In [45]:
```
titanic_data['SibSp'].unique()
```

Out[45]:
```
array([1, 0, 3, 4, 2, 5, 8])
```

In [46]:
```
sibsp_distribution = titanic_data['SibSp'].value_counts().sort_index()

# Plotting the distribution
plt.bar(sibsp_distribution.index, sibsp_distribution.values)
plt.xlabel('Number of Siblings/Spouses')
plt.ylabel('Count')
plt.title('Distribution of Number of Siblings/Spouses')
plt.xticks(sibsp_distribution.index)
plt.show()
```



Parch Column

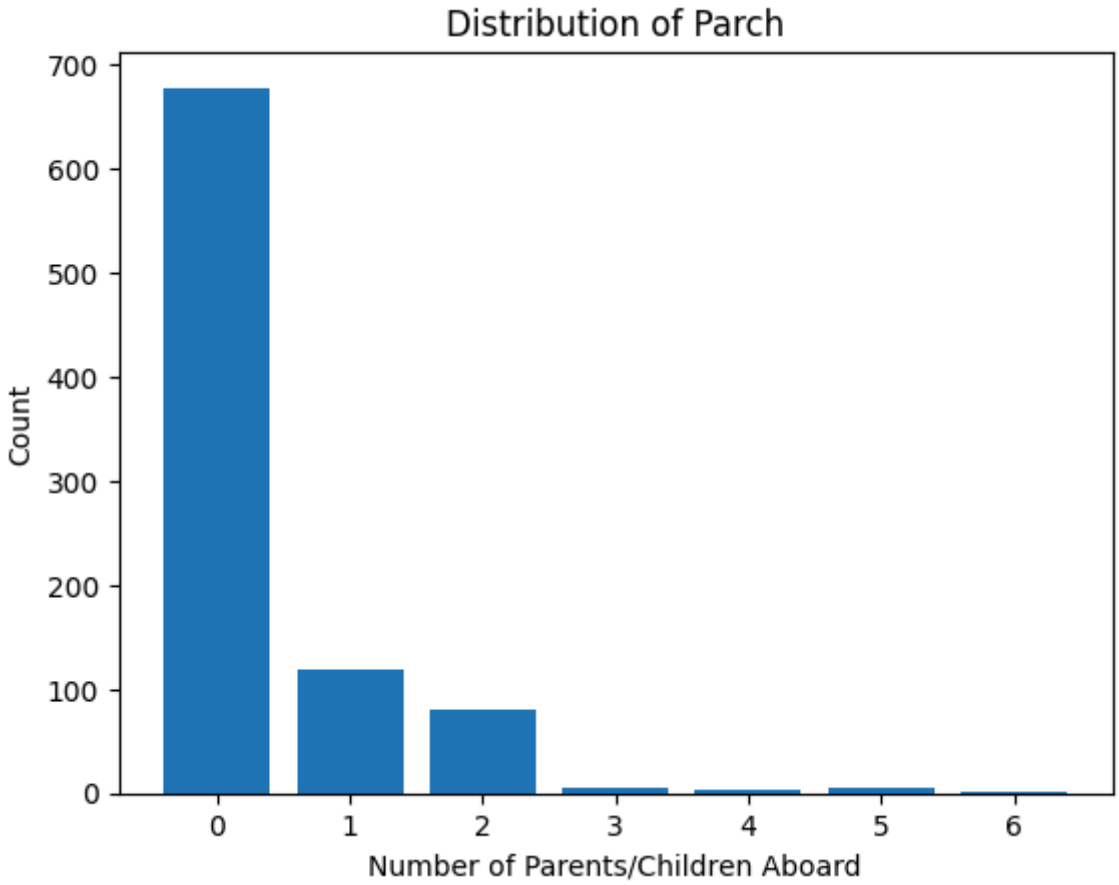
In [47]:
```
titanic_data['Parch']
```

Out[47]:
```
0      0
1      0
2      0
3      0
4      0
      ..
886    0
887    0
888    2
889    0
890    0
Name: Parch, Length: 891, dtype: int64
```

In [48]:
```
titanic_data['Parch'].unique()
```

Out[48]:
```
array([0, 1, 2, 5, 3, 4, 6])
```

In [50]:
```
 #Count the occurrences of each unique value in 'Parch'
parch_counts = titanic_data['Parch'].value_counts()

# Create a bar plot
plt.bar(parch_counts.index, parch_counts.values)

# Add labels and title
plt.xlabel('Number of Parents/Children Aboard')
plt.ylabel('Count')
plt.title('Distribution of Parch')

# Show the plot
plt.show()
```



In [51]:
```
titanic_data['Ticket']
```

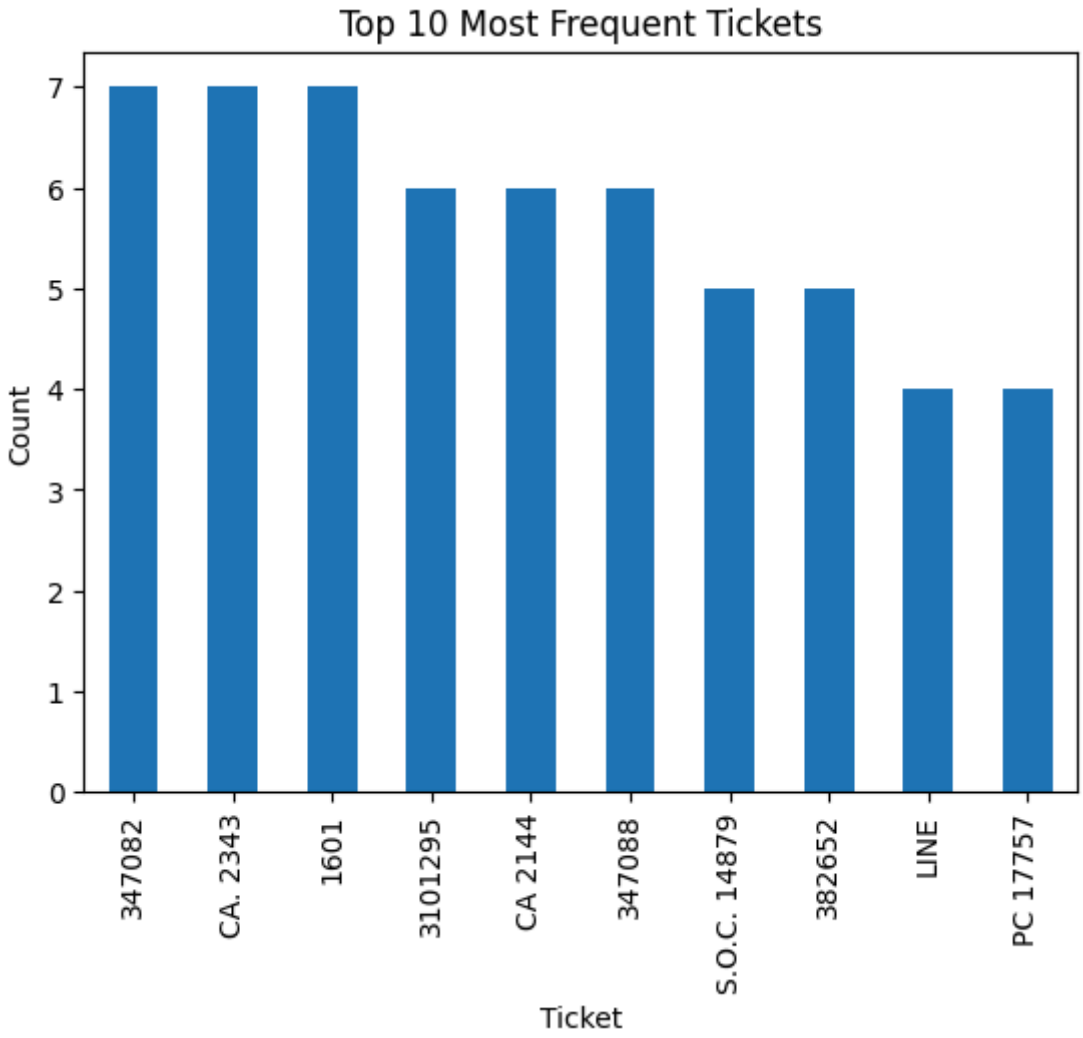
Out[51]:
```
0             A/5 21171
1              PC 17599
2      STON/O2. 3101282
3                113803
4                373450
              ...
886              211536
887              112053
888          W./C. 6607
889              111369
890              370376
Name: Ticket, Length: 891, dtype: object
```

Ticket Column

In [54]:
```
titanic_data['Ticket'].nunique()
```

Out[54]:
```
681
```

In [55]:
```
# Get the top 10 most frequent ticket values
top_tickets = titanic_data['Ticket'].value_counts().head(10)

# Create a bar plot
top_tickets.plot(kind='bar')

# Add labels and title
plt.xlabel('Ticket')
plt.ylabel('Count')
plt.title('Top 10 Most Frequent Tickets')

# Show the plot
plt.show()
```



In [43]:
```
titanic_data.columns
```

Out[43]:
```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
      dtype='object')
```

Fare Column

In [57]:
```
titanic_data['Fare']
```

Out[57]:
```
0       7.2500
1      71.2833
2       7.9250
3      53.1000
4       8.0500
        ...
886    13.0000
887    30.0000
888    23.4500
889    30.0000
890     7.7500
Name: Fare, Length: 891, dtype: float64
```

In [59]:
```
titanic_data['Fare'].unique()
```

Out[59]:
```
array([  7.25  ,  71.2833,   7.925 ,  53.1   ,   8.05  ,   8.4583,
        51.8625,  21.075 ,  11.1333,  30.0708,  16.7   ,  26.55  ,
        31.275 ,   7.8542,  16.    ,  29.125 ,  13.    ,  18.    ,
         7.225 ,  26.    ,   8.0292,  35.5   ,  31.3875, 263.    ,
         7.8792,   7.8958,  27.7208, 146.5208,   7.75  ,  10.5   ,
        82.1708,  52.    ,   7.2292,  11.2417,   9.475 ,  21.    ,
        41.5792,  15.5   ,  21.6792,  17.8   ,  39.6875,   7.8   ,
        76.7292,  61.9792,  27.75  ,  46.9   ,  80.    ,  83.475 ,
        27.9   ,  15.2458,   8.1583,   8.6625,  73.5   ,  14.4542,
        56.4958,   7.65  ,  29.    ,  12.475 ,   9.    ,   9.5   ,
         7.7875,  47.1   ,  15.85  ,  34.375 ,  61.175 ,  20.575 ,
        34.6542,  63.3583,  23.    ,  77.2875,   8.6542,   7.775 ,
        24.15  ,   9.825 ,  14.4583, 247.5208,   7.1417,  22.3583,
         6.975 ,   7.05  ,  14.5   ,  15.0458,  26.2833,   9.2167,
        79.2   ,   6.75  ,  11.5   ,  36.75  ,   7.7958,  12.525 ,
        66.6   ,   7.3125,  61.3792,   7.7333,  69.55  ,  16.1   ,
        15.75  ,  20.525 ,  55.    ,  25.925 ,  33.5   ,  30.6958,
        25.4667,  28.7125,   0.    ,  15.05  ,  39.    ,  22.025 ,
        50.    ,   8.4042,   6.4958,  10.4625,  18.7875,  31.    ,
       113.275 ,  27.    ,  76.2917,  90.    ,   9.35  ,  13.5   ,
         7.55  ,  26.25  ,  12.275 ,   7.125 ,  52.5542,  20.2125,
        86.5   , 512.3292,  79.65  , 153.4625, 135.6333,  19.5   ,
        29.7   ,  77.9583,  20.25  ,  78.85  ,  91.0792,  12.875 ,
         8.85  , 151.55  ,  30.5   ,  23.25  ,  12.35  , 110.8833,
       108.9   ,  24.    ,  56.9292,  83.1583, 262.375 ,  14.    ,
       164.8667, 134.5   ,   6.2375,  57.9792,  28.5   , 133.65  ,
        15.9   ,   9.225 ,  35.    ,  75.25  ,  69.3   ,  55.4417,
       211.5   ,   4.0125, 227.525 ,  15.7417,   7.7292,  12.    ,
       120.    ,  12.65  ,  18.75  ,   6.8583,  32.5   ,   7.875 ,
        14.4   ,  55.9   ,   8.1125,  81.8583,  19.2583,  19.9667,
        89.1042,  38.5   ,   7.725 ,  13.7917,   9.8375,   7.0458,
         7.5208,  12.2875,   9.5875,  49.5042,  78.2667,  15.1   ,
         7.6292,  22.525 ,  26.2875,  59.4   ,   7.4958,  34.0208,
        93.5   , 221.7792, 106.425 ,  49.5   ,  71.    ,  13.8625,
         7.8292,  39.6   ,  17.4   ,  51.4792,  26.3875,  30.    ,
        40.125 ,   8.7125,  15.    ,  33.    ,  42.4   ,  15.55  ,
        65.    ,  32.3208,   7.0542,   8.4333,  25.5875,   9.8417,
         8.1375,  10.1708, 211.3375,  57.    ,  13.4167,   7.7417,
         9.4833,   7.7375,   8.3625,  23.45  ,  25.9292,   8.6833,
         8.5167,   7.8875,  37.0042,   6.45  ,   6.95  ,   8.3   ,
         6.4375,  39.4   ,  14.1083,  13.8583,  50.4958,   5.    ,
         9.8458,  10.5167])
```

**Normalizing fare column for readability **

In [60]:
```
titanic_data['Fare'] = titanic_data['Fare'].apply(lambda x: "${:.2f}".forma

# Display the formatted 'Fare' column
print(titanic_data['Fare'])
```

```
0       $7.25
1      $71.28
2       $7.92
3      $53.10
4       $8.05
        ...
886    $13.00
887    $30.00
888    $23.45
889    $30.00
890     $7.75
Name: Fare, Length: 891, dtype: object
```

In [61]:
```
titanic_data
```

Out[61]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare
0	1	0	3	Braund, Mr. Owen Harris	male	22	1	0	A/5 21171	$7.25
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38	1	0	PC 17599	$71.28
2	3	1	3	Heikkinen, Miss. Laina	female	26	0	0	STON/O2. 3101282	$7.92
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35	1	0	113803	$53.10
4	5	0	3	Allen, Mr. William Henry	male	35	0	0	373450	$8.05
...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	Montvila, Rev. Juozas	male	27	0	0	211536	$13.00
887	888	1	1	Graham, Miss. Margaret Edith	female	19	0	0	112053	$30.00
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	23	1	2	W./C. 6607	$23.45
889	890	1	1	Behr, Mr. Karl Howell	male	26	0	0	111369	$30.00
890	891	0	3	Dooley, Mr. Patrick	male	32	0	0	370376	$7.75

891 rows × 12 columns

Data Analysis : Insights from the given dataset

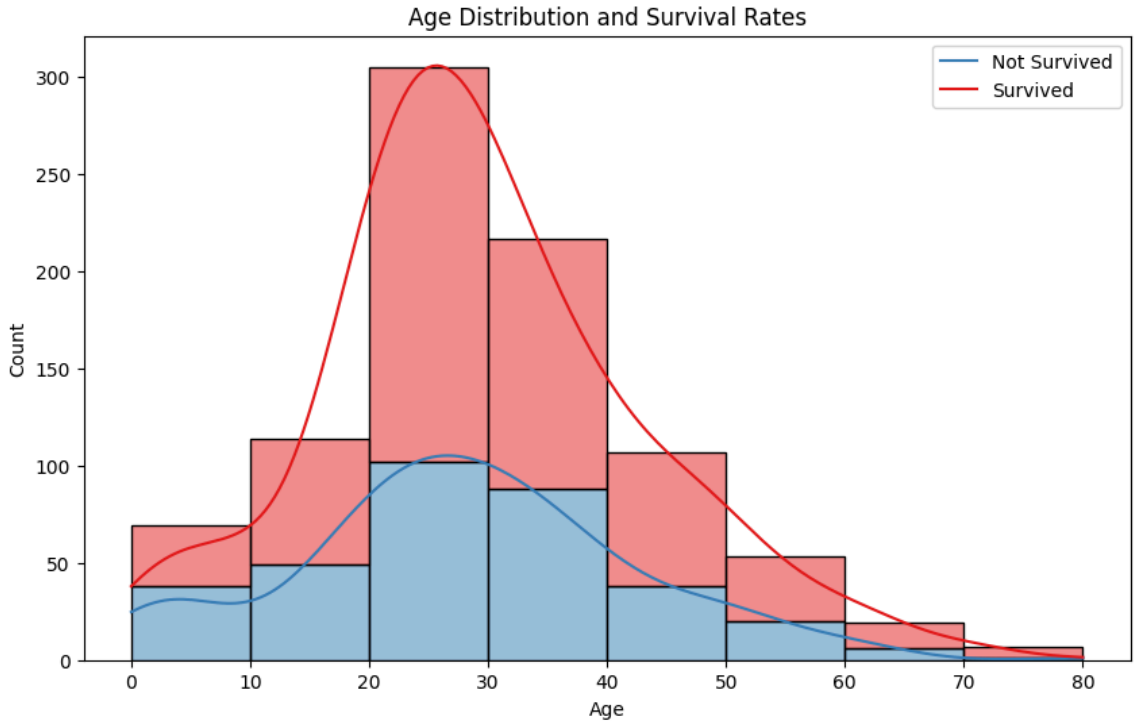
Survival Rate of the Passengers

In [65]:
```
# Count total number of passengers
total_passengers = len(titanic_data)

# Count number of survivors
survivors = titanic_data['Survived'].sum()

# Calculate survival rate
survival_rate = (survivors / total_passengers) * 100

print("Survival Rate: {:.2f}%".format(survival_rate))
```

```
Survival Rate: 38.38%
```

Survival Rate by age groups

In [66]:
```
import matplotlib.pyplot as plt
import seaborn as sns

# Define age groups
age_bins = [0, 10, 20, 30, 40, 50, 60, 70, 80]
age_labels = ['0-10', '11-20', '21-30', '31-40', '41-50', '51-60', '61-70',

# Categorize passengers into age groups
titanic_data['AgeGroup'] = pd.cut(titanic_data['Age'], bins=age_bins, labels

# Calculate survival rate for each age group
survival_by_age = titanic_data.groupby('AgeGroup')['Survived'].mean() * 100

# Plot age distribution and survival rates
plt.figure(figsize=(10, 6))
sns.histplot(data=titanic_data, x='Age', bins=age_bins, kde=True, hue='Surv
plt.xlabel('Age')
plt.ylabel('Count')
plt.title('Age Distribution and Survival Rates')
plt.legend(labels=['Not Survived', 'Survived'], loc='upper right')
plt.show()

# Print survival rate by age group
print("Survival Rate by Age Group:")
print(survival_by_age)
```

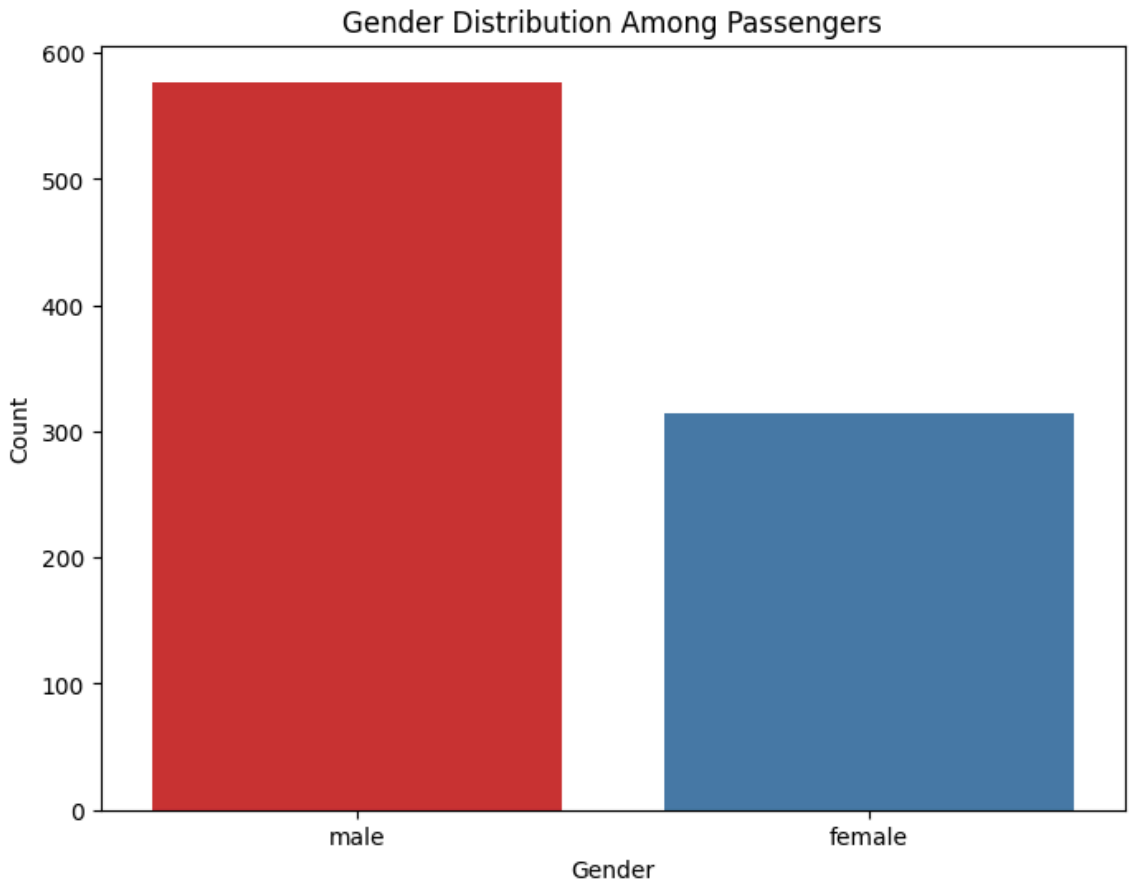


```
Survival Rate by Age Group:
AgeGroup
0-10     49.253731
11-20    40.625000
21-30    33.639144
31-40    42.187500
41-50    36.274510
51-60    36.956522
61-70    22.222222
71-80    25.000000
Name: Survived, dtype: float64
```

`Survival Rate By Gender

In [67]:
```
import matplotlib.pyplot as plt
import seaborn as sns

# Analyze gender distribution
gender_distribution = titanic_data['Sex'].value_counts()

# Calculate survival rate for each gender
survival_by_gender = titanic_data.groupby('Sex')['Survived'].mean() * 100

# Plot gender distribution
plt.figure(figsize=(8, 6))
sns.countplot(data=titanic_data, x='Sex', palette='Set1')
plt.xlabel('Gender')
plt.ylabel('Count')
plt.title('Gender Distribution Among Passengers')
plt.show()

# Print survival rate by gender
print("Survival Rate by Gender:")
print(survival_by_gender)
```

```
<ipython-input-67-af976721fd77>:12: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be remove
d in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for
the same effect.

  sns.countplot(data=titanic_data, x='Sex', palette='Set1')
```

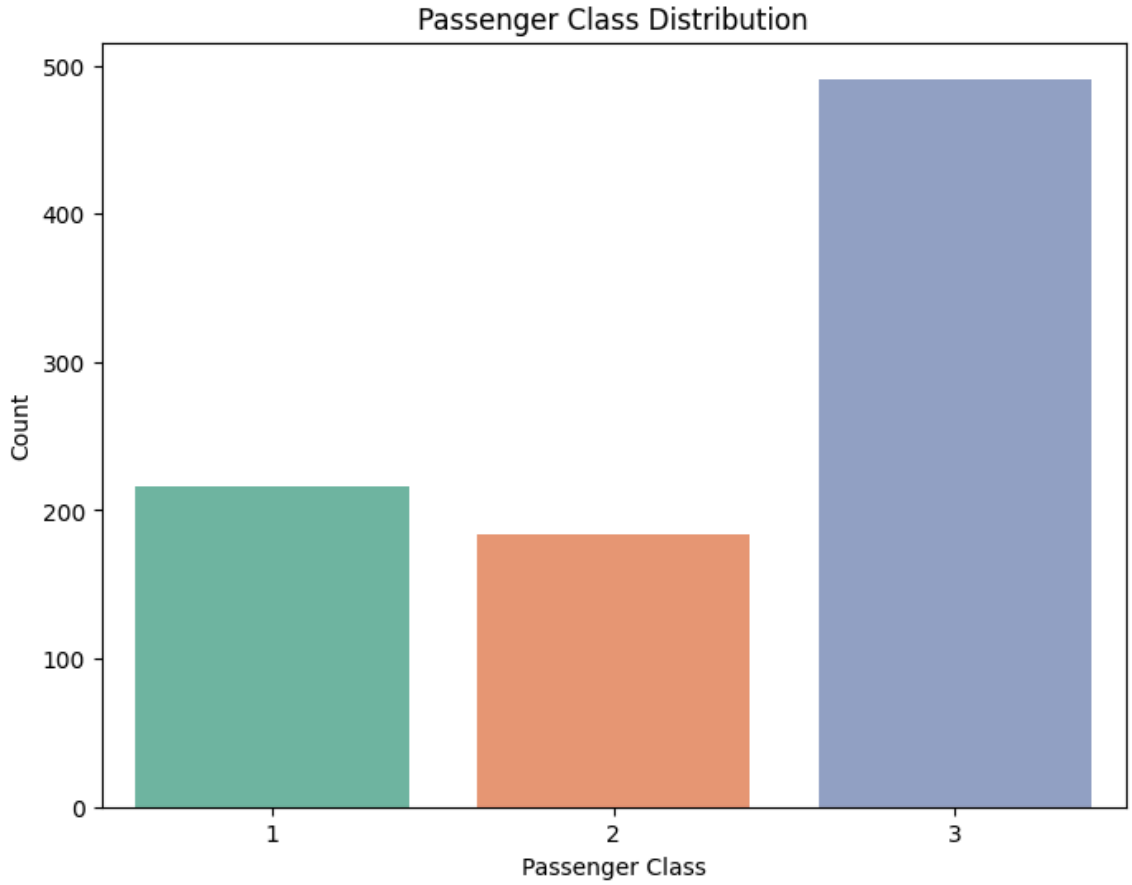


```
Survival Rate by Gender:
Sex
female    74.203822
male      18.890815
Name: Survived, dtype: float64
```

Survival Rate by Passenger Class

In [68]:
```
import matplotlib.pyplot as plt
import seaborn as sns

# Analyze class distribution
class_distribution = titanic_data['Pclass'].value_counts()

# Calculate survival rate for each class
survival_by_class = titanic_data.groupby('Pclass')['Survived'].mean() * 100

# Plot class distribution
plt.figure(figsize=(8, 6))
sns.countplot(data=titanic_data, x='Pclass', palette='Set2')
plt.xlabel('Passenger Class')
plt.ylabel('Count')
plt.title('Passenger Class Distribution')
plt.show()

# Print survival rate by class
print("Survival Rate by Passenger Class:")
print(survival_by_class)
```

```
<ipython-input-68-7f538d4a36d4>:12: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be remove
d in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for
the same effect.

  sns.countplot(data=titanic_data, x='Pclass', palette='Set2')
```

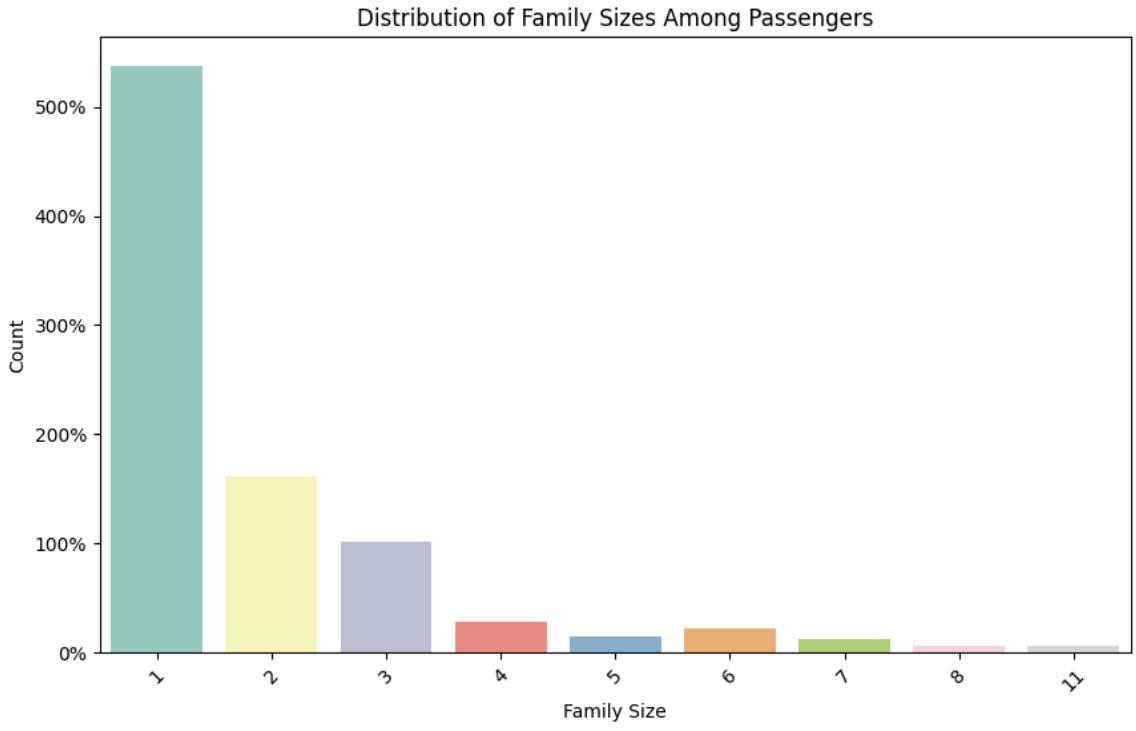


```
Survival Rate by Passenger Class:
Pclass
1    62.962963
2    47.282609
3    24.236253
Name: Survived, dtype: float64
```

Family Size Analysis

In [70]:
```
# Calculate family size
titanic_data['FamilySize'] = titanic_data['SibSp'] + titanic_data['Parch'] +

# Analyze distribution of family sizes
family_size_distribution = titanic_data['FamilySize'].value_counts().sort_i

# Calculate survival rate based on family size
survival_by_family_size = titanic_data.groupby('FamilySize')['Survived'].me

# Plot distribution of family sizes
plt.figure(figsize=(10, 6))
sns.barplot(x=family_size_distribution.index, y=family_size_distribution.va
plt.xlabel('Family Size')
plt.ylabel('Count')
plt.title('Distribution of Family Sizes Among Passengers')
plt.xticks(rotation=45)

# Change y-axis labels to percentages
plt.gca().set_yticklabels(['{:.0f}%'.format(x) for x in plt.gca().get_ytick

plt.show()

# Print survival rate by family size
print("Survival Rate by Family Size:")
print(survival_by_family_size)
```

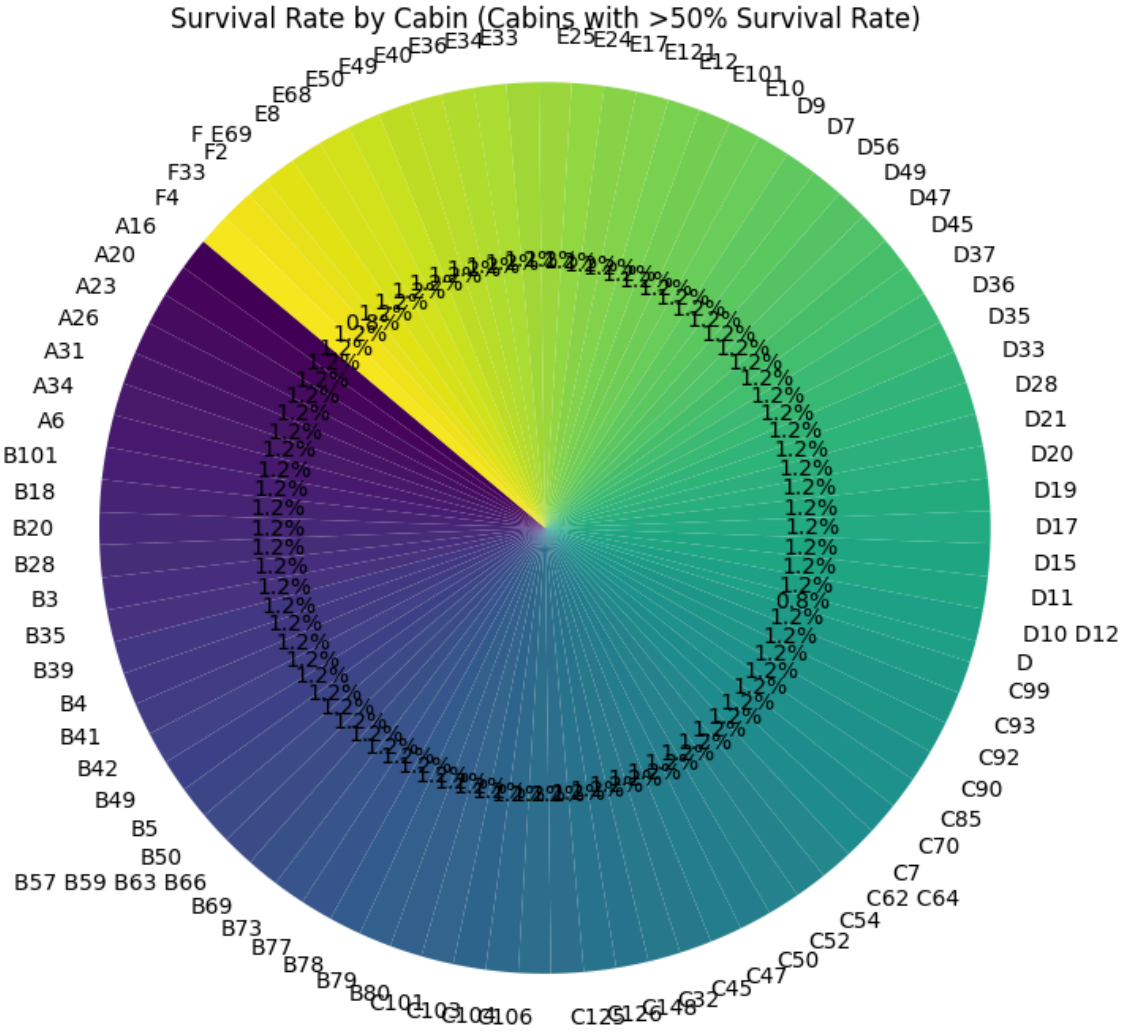
```
<ipython-input-70-b5d82f4cc0ff>:12: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be remove
d in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for
the same effect.

  sns.barplot(x=family_size_distribution.index, y=family_size_distributio
n.values, palette='Set3')
<ipython-input-70-b5d82f4cc0ff>:19: UserWarning: FixedFormatter should onl
y be used together with FixedLocator
  plt.gca().set_yticklabels(['{:.0f}%'.format(x) for x in plt.gca().get_yt
icks()])
```



```
Survival Rate by Family Size:
FamilySize
1     30.353818
2     55.279503
3     57.843137
4     72.413793
5     20.000000
6     13.636364
7     33.333333
8      0.000000
11     0.000000
Name: Survived, dtype: float64
```

High survival Rate Cabins

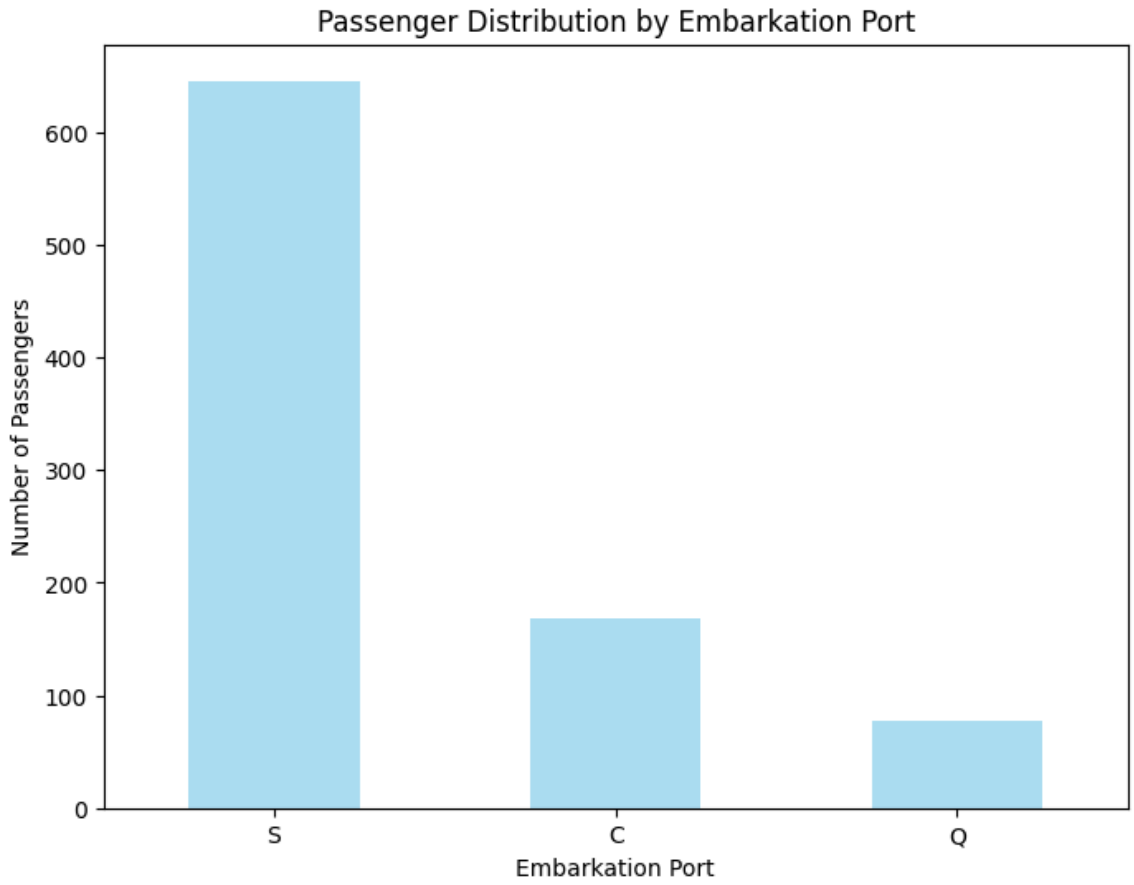
In [80]:
```
# Filter out cabins with survival rates less than a certain threshold (e.g.,
high_survival_cabins = cabin_survival_rate[cabin_survival_rate > 50]

# Plot the survival rate for selected cabins in a pie chart
plt.figure(figsize=(8, 8))
plt.pie(high_survival_cabins, labels=high_survival_cabins.index, autopct='%
plt.title('Survival Rate by Cabin (Cabins with >50% Survival Rate)')
plt.axis('equal')  # Equal aspect ratio ensures that pie is drawn as a circ
plt.show()
```



Embarkation Port Analysis

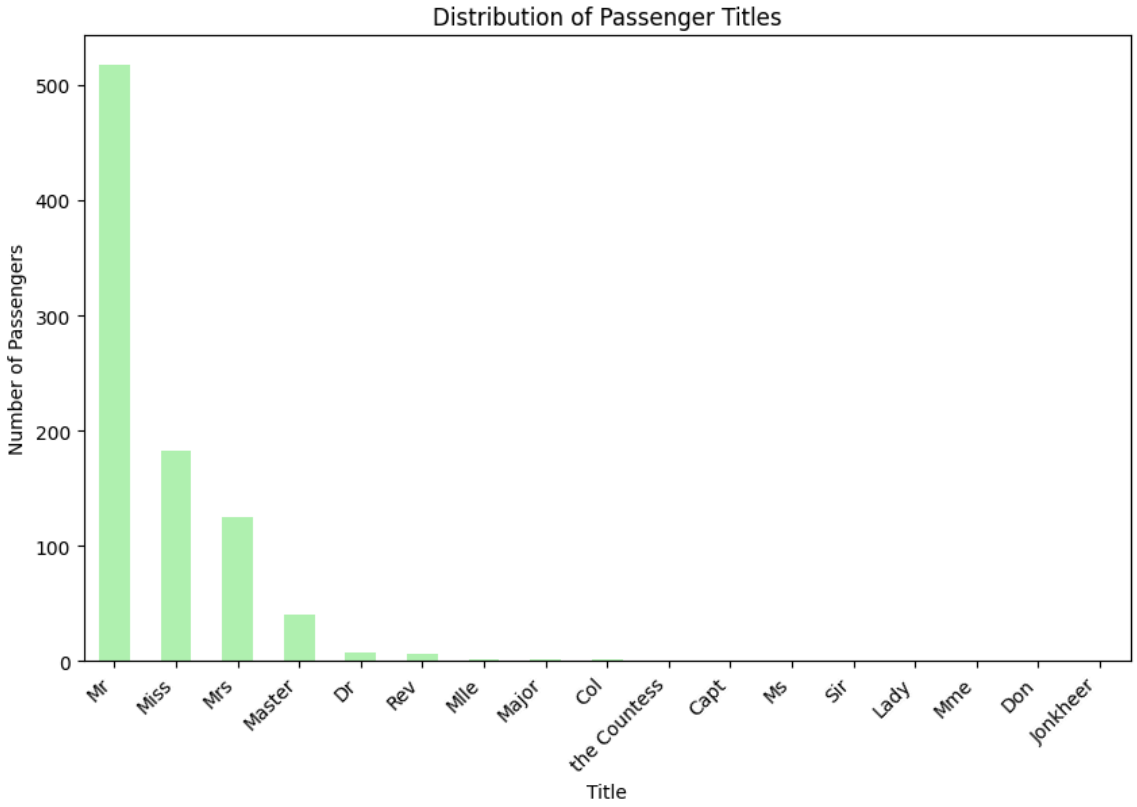
In [81]:

```
# Count passengers embarked at each port
embarkation_counts = titanic_data['Embarked'].value_counts()

# Plot
plt.figure(figsize=(8, 6))
embarkation_counts.plot(kind='bar', color='skyblue', alpha=0.7)
plt.title('Passenger Distribution by Embarkation Port')
plt.xlabel('Embarkation Port')
plt.ylabel('Number of Passengers')
plt.xticks(rotation=0)
plt.show()
```



Name Analysis

In [82]:
```
# Extract titles from names
titanic_data['Title'] = titanic_data['Name'].apply(lambda name: name.split(

# Count occurrences of each title
title_counts = titanic_data['Title'].value_counts()

# Plot
plt.figure(figsize=(10, 6))
title_counts.plot(kind='bar', color='lightgreen', alpha=0.7)
plt.title('Distribution of Passenger Titles')
plt.xlabel('Title')
plt.ylabel('Number of Passengers')
plt.xticks(rotation=45, ha='right')
plt.show()
```



In [89]:
```
titanic_data.to_csv('/content/drive/My Drive/titanic_dataset.csv', index=Fa
```

In [90]:
```
from google.colab import files
files.download('/content/drive/My Drive/titanic_dataset.csv')
```

```
<IPython.core.display.Javascript object>

<IPython.core.display.Javascript object>
```