Applied and Practical Data science

Team name - WSU Final

Apoorva Palle (Z248H929) , Areeba Mohiuddin (D655Y483) , Sri Manikanta Reddy Tangirala (G332B644) , Lakshmi Vasanthi Godi (V567R326)

Importing all the requiraryes

In [1]:
```
import pandas as pd
from sklearn.model_selection import train_test_split
from tabulate import tabulate
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
from sklearn.tree import DecisionTreeRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.metrics import mean_squared_error
from sklearn.metrics import r2_score
from sklearn.metrics import accuracy_score
from sklearn.svm import SVC
import seaborn as sns
```

In [2]:
```
df = pd.read_csv("C:\\Users\\Aneesh Reddy\\OneDrive\\Desktop\\appu ads EDA\\GSS2018

AGE = df['AGE']
RELIG = df['RELIG']
CLASS = df['CLASS']
PARTYID = df['PARTYID']
PRES12 = df['PRES12']
Jew = df['Jew']
OTHER = df['OTHER']
ROWNGUN = df['ROWNGUN']
OTH16 = df['OTH16']
SEI10EDUC = df['SEI10EDUC']
PRES16 = df['PRES16']
X = pd.DataFrame({
    'AGE': AGE,
    'RELIG': RELIG,
    'CLASS': CLASS,
    'PARTYID': PARTYID,
    'PRES12': PRES12,
    'Jew': Jew,
    'OTHER': OTHER,
    'ROWNGUN': ROWNGUN,
    'OTH16': OTH16,
    'SEI10EDUC': SEI10EDUC
})
```

```
y = PRES16
X.head()
```

Out[2]:

	AGE	RELIG	CLASS	PARTYID	PRES12	Jew	OTHER	ROWNGUN	OTH16	SEI10EDUC
0	43	11	2	5	2	0	0	0	0	82.4
1	74	2	2	2	1	0	0	0	0	16.5
2	42	4	3	4	2	0	0	0	0	89.4
3	63	1	3	2	2	0	0	0	0	86.7
4	71	2	4	6	2	0	0	1	0	79.2

Displayed the total number of NULL values in the data set

In [3]:
```
a = X.isna().sum()
print("Total number of Null vales in data set :\n ",a)
```

```
Total number of Null vales in data set :
  AGE          0
RELIG        0
CLASS        0
PARTYID      0
PRES12       0
Jew          0
OTHER        0
ROWNGUN      0
OTH16        0
SEI10EDUC    0
dtype: int64
```

Displayed the total number of duplicate values in the data set

In [4]:
```
b = df.duplicated().sum()
print("Total number of duplicate values in data set : ",b)
```

```
Total number of duplicate values in data set :  0
```

Identifying outliers

In [5]:
```
Q1 = X['AGE'].quantile(0.25)
Q3 = X['AGE'].quantile(0.75)
IQR = Q3 - Q1
l_b = Q1 - 1.5 * IQR
u_b = Q3 + 1.5 * IQR
Outliers = X[(X['AGE'] < l_b) | (X['AGE'] > u_b)]
print(Outliers)
```

```
Empty DataFrame
Columns: [AGE, RELIG, CLASS, PARTYID, PRES12, Jew, OTHER, ROWNGUN, OTH16, SEI10EDUC]
Index: []
```

Printing Top 10 correlations of the Target Variable

In [6]:
```
correlation_matrix = df.corr()
correlation_with_target = correlation_matrix['PRES16']
top_10_correlations = correlation_with_target.drop('PRES16').nlargest(10)
print(top_10_correlations)
```

```
PRES12       0.555662
PARTYID      0.239217
OTHER        0.185116
Jew          0.166840
AGE          0.162831
ROWNGUN      0.157964
RELIG        0.152613
OTH16        0.150806
CLASS        0.141861
SEI10EDUC    0.140594
Name: PRES16, dtype: float64
```

Printing the Dependend and Independent variables

In [7]:
```
print("Dependent Variable ""y"": ""PRES16""\n",y.head(3))
print("Independent Variables ""X"" : \n",X.head(3))
```

```
Dependent Variable y: PRES16
 0    2
1    2
2    2
Name: PRES16, dtype: int64
Independent Variables X :
    AGE  RELIG  CLASS  PARTYID  PRES12  Jew  OTHER  ROWNGUN  OTH16  SEI10EDUC
0   43     11      2        5       2    0      0        0      0       82.4
1   74      2      2        2       1    0      0        0      0       16.5
2   42      4      3        4       2    0      0        0      0       89.4
```

Creating a table for Independent Variables and Dependent Variable

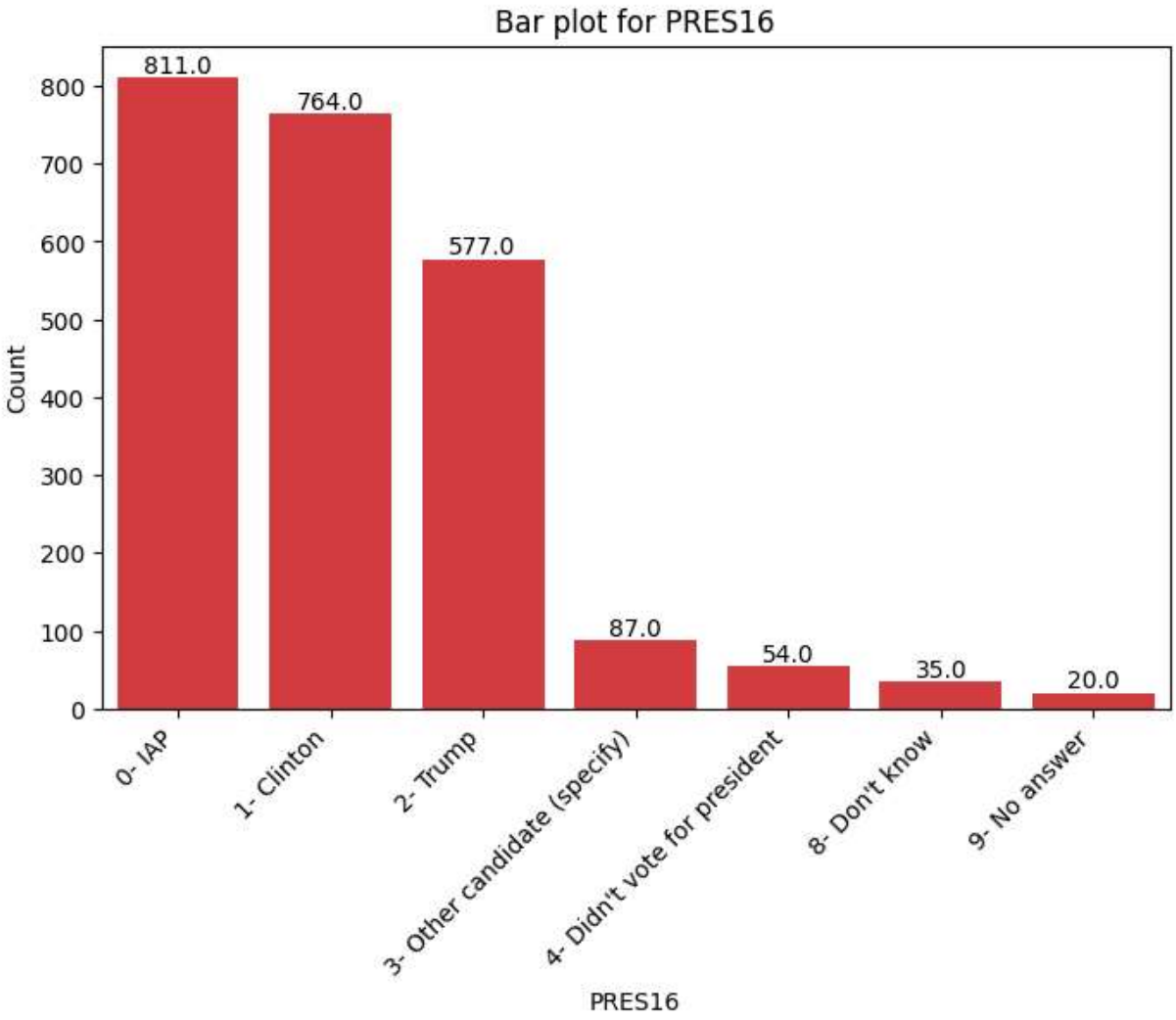
In [8]:
```
data = {'Dependent Variable': ['PRES16'],
        'Independent Variables': ['AGE' , 'RELIG' ,'CLASS','PARTYID','PRES12','Jew'
max_l = max(len(val) for val in data.values())
for key, val in data.items():
    if len(val) < max_l:
        data[key].extend(['None'] * (max_l - len(val)))
df2 = pd.DataFrame(data)
print(df2)
```

	Dependent Variable	Independent Variables
0	PRES16	AGE
1	None	RELIG
2	None	CLASS
3	None	PARTYID
4	None	PRES12
5	None	Jew
6	None	OTHER
7	None	ROWNGUN
8	None	OTH16
9	None	SEI10EDUC

Data Visualization

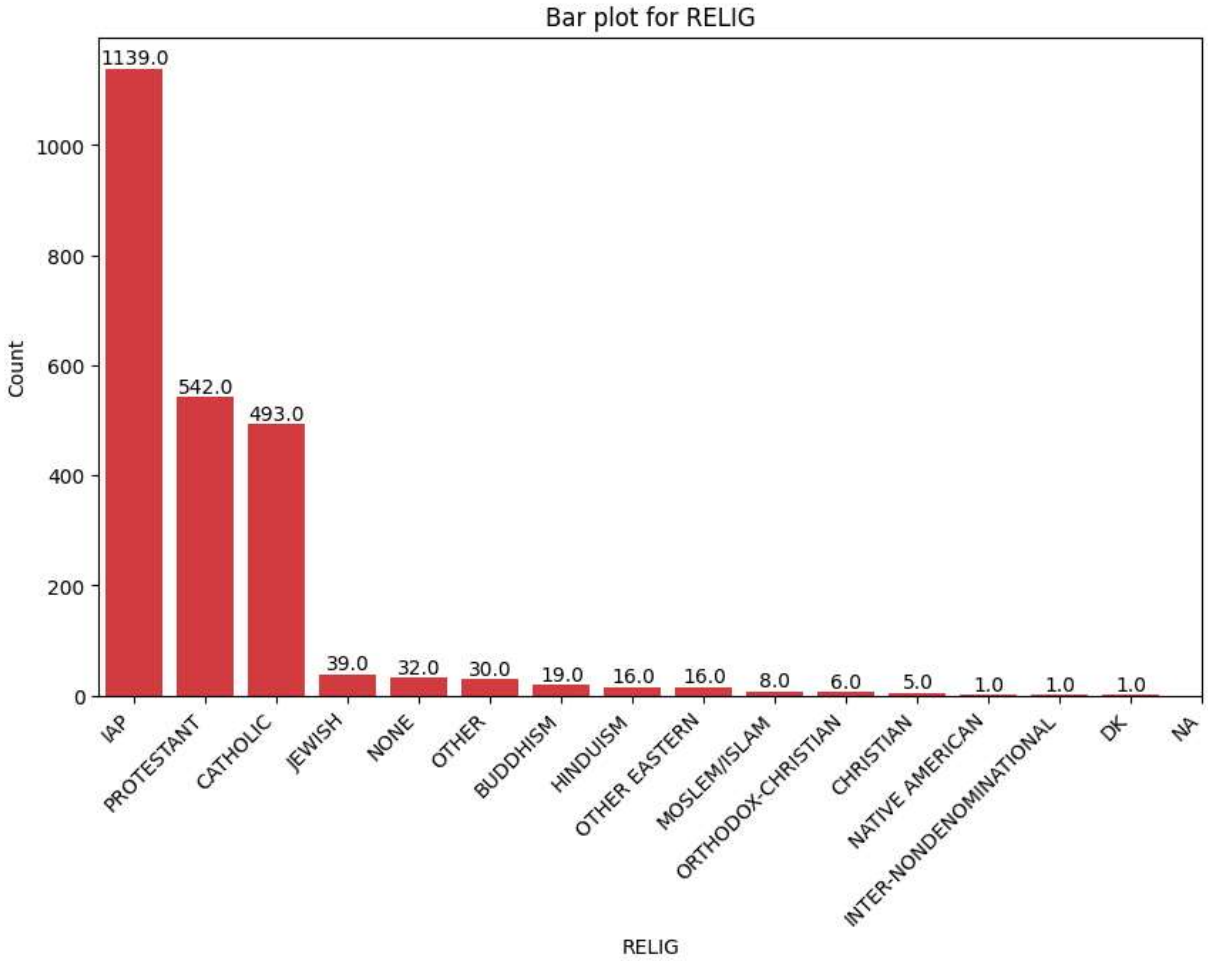
Bar plot for Dependent Variable PRES16

In [9]:
```
plt.figure(figsize=(8,5))
sns.countplot(data=df, x='PRES16', order=df['PRES16'].value_counts().index, color='
plt.title('Bar plot for PRES16')
plt.xlabel('PRES16')
plt.ylabel('Count')
for p in plt.gca().patches:
    plt.gca().annotate(f'{p.get_height()}', (p.get_x() + p.get_width() / 2, p.get_h
x_labels = ['0- IAP', '1- Clinton', '2- Trump', '3- Other candidate (specify)', "4-
x_ticks = range(len(x_labels))
plt.gca().set_xticks(x_ticks)
plt.gca().set_xticklabels(x_labels, rotation = 45, ha= 'right')
plt.show()
```



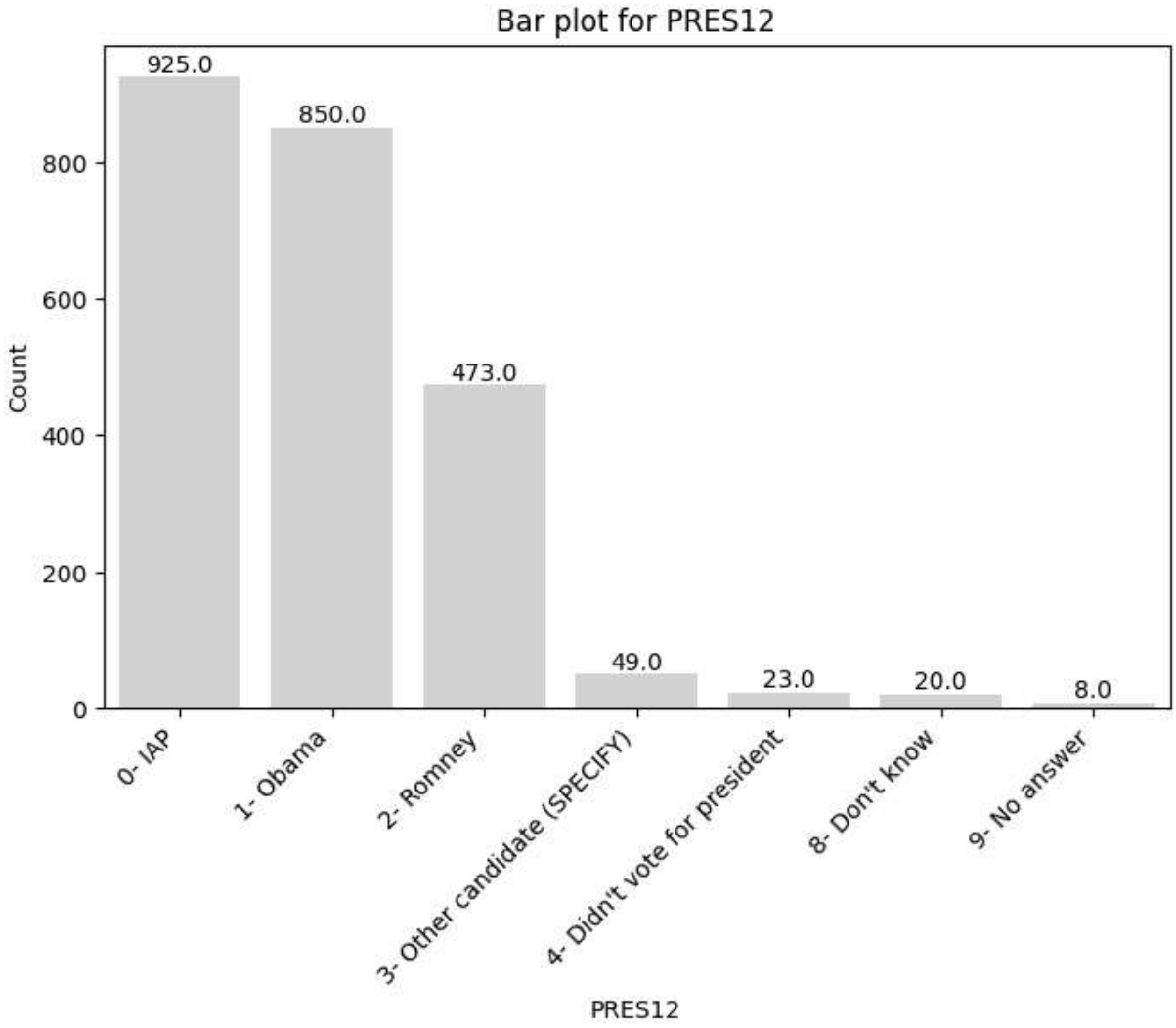
Bar plot for Independent Variable RELIG

In [10]:
```
plt.figure(figsize=(10, 6))
sns.countplot(data=df, x='RELIG', order=df['RELIG'].value_counts().index, color='#E
plt.title('Bar plot for RELIG')
plt.xlabel('RELIG')
plt.ylabel('Count')
for p in plt.gca().patches:
    plt.gca().annotate(f'{p.get_height()}', (p.get_x() + p.get_width() / 2, p.get_h
x_labels = ['IAP', 'PROTESTANT', 'CATHOLIC', 'JEWISH', 'NONE', 'OTHER', 'BUDDHISM',
x_ticks = range(len(x_labels))
plt.gca().set_xticks(x_ticks)
plt.gca().set_xticklabels(x_labels, rotation=45, ha='right')

plt.show()
```



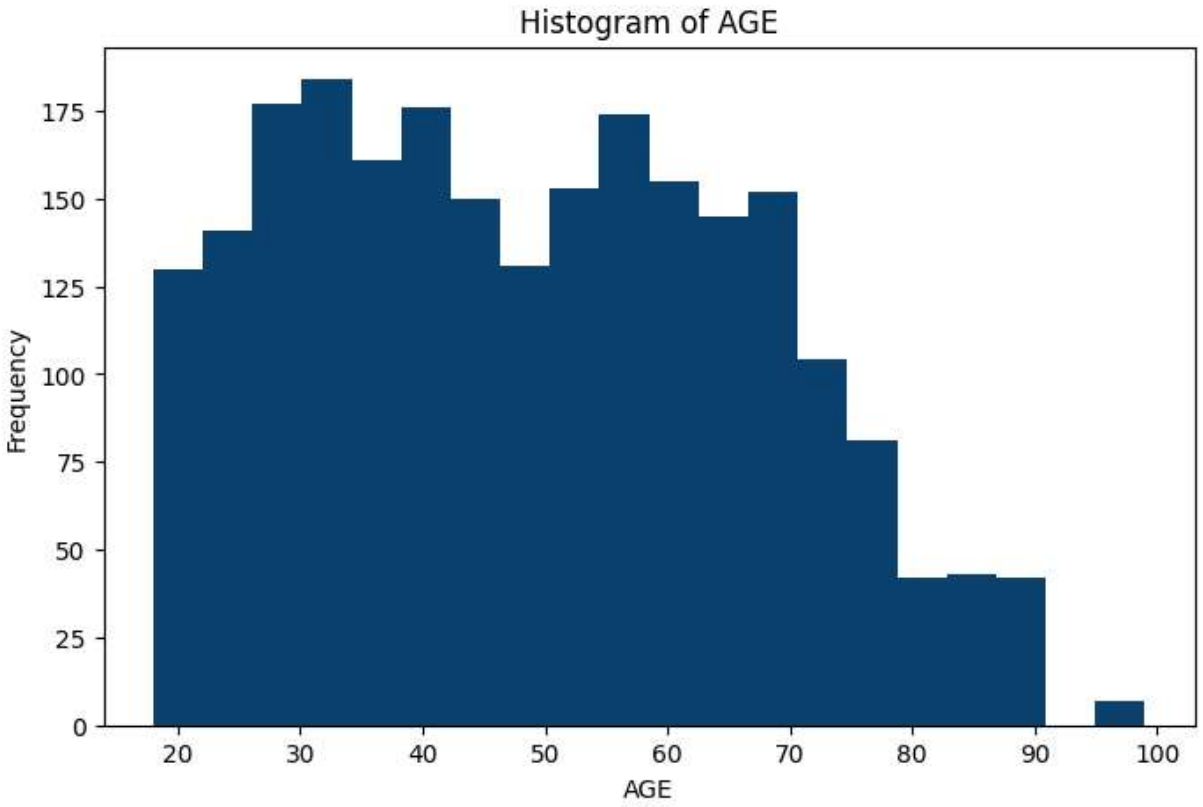
Bar plot for Variable PRES12

In [11]:
```
plt.figure(figsize=(8,5))
sns.countplot(data=df, x='PRES12', order=df['PRES12'].value_counts().index, color=
plt.title('Bar plot for PRES12')
plt.xlabel('PRES12')
plt.ylabel('Count')
for p in plt.gca().patches:
    plt.gca().annotate(f'{p.get_height()}', (p.get_x() + p.get_width() / 2, p.get_h
x_labels = ['0- IAP', '1- Obama', '2- Romney', '3- Other candidate (SPECIFY)', "4-
x_ticks = range(len(x_labels))
plt.gca().set_xticks(x_ticks)
plt.gca().set_xticklabels(x_labels, rotation=45, ha='right')

plt.show()
```

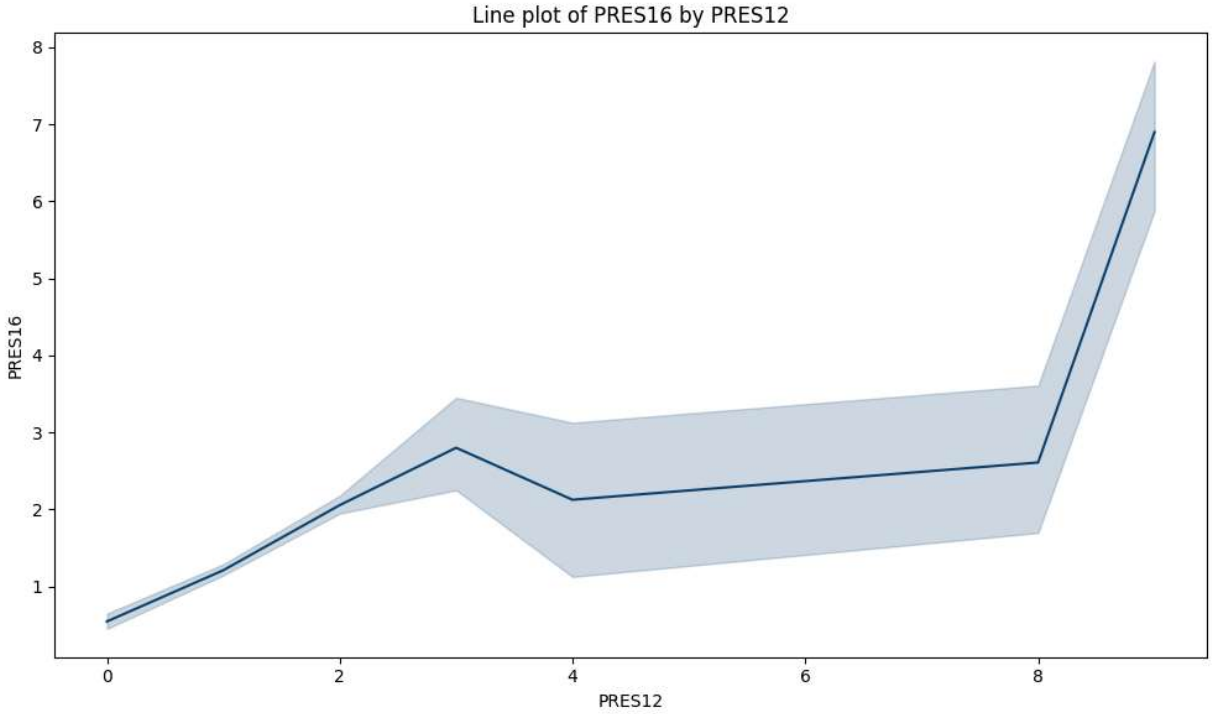


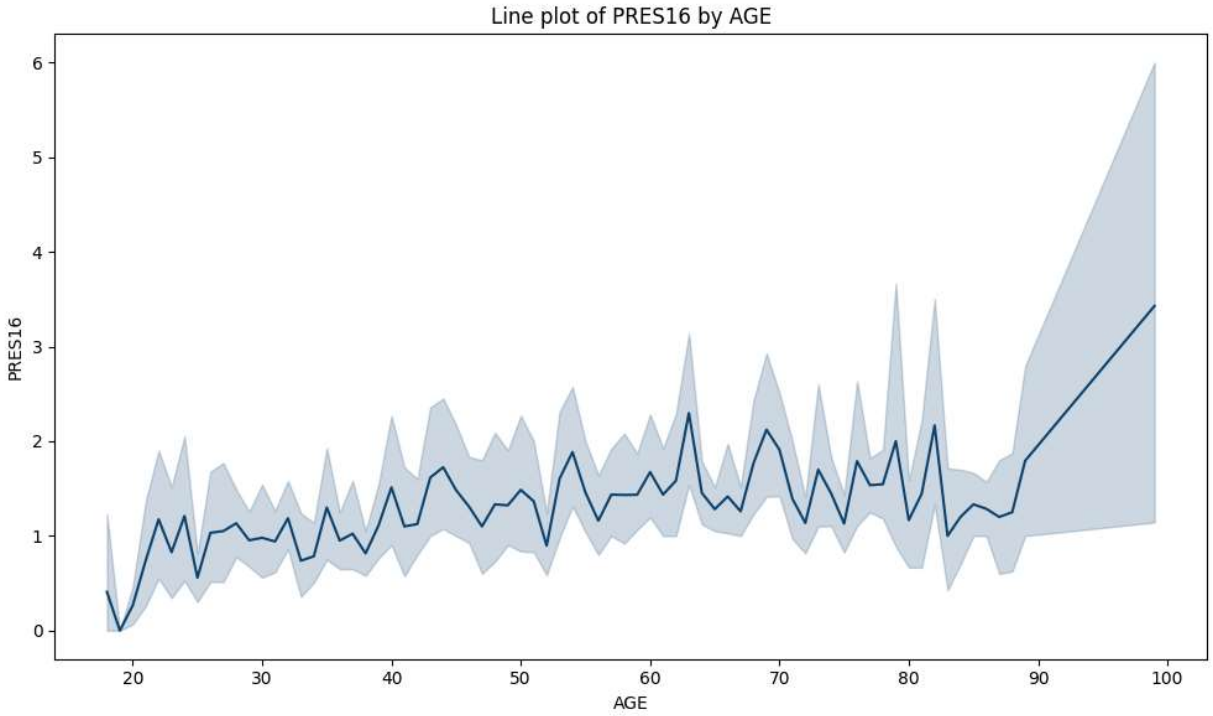
Bar plot for Independent Variable AGE

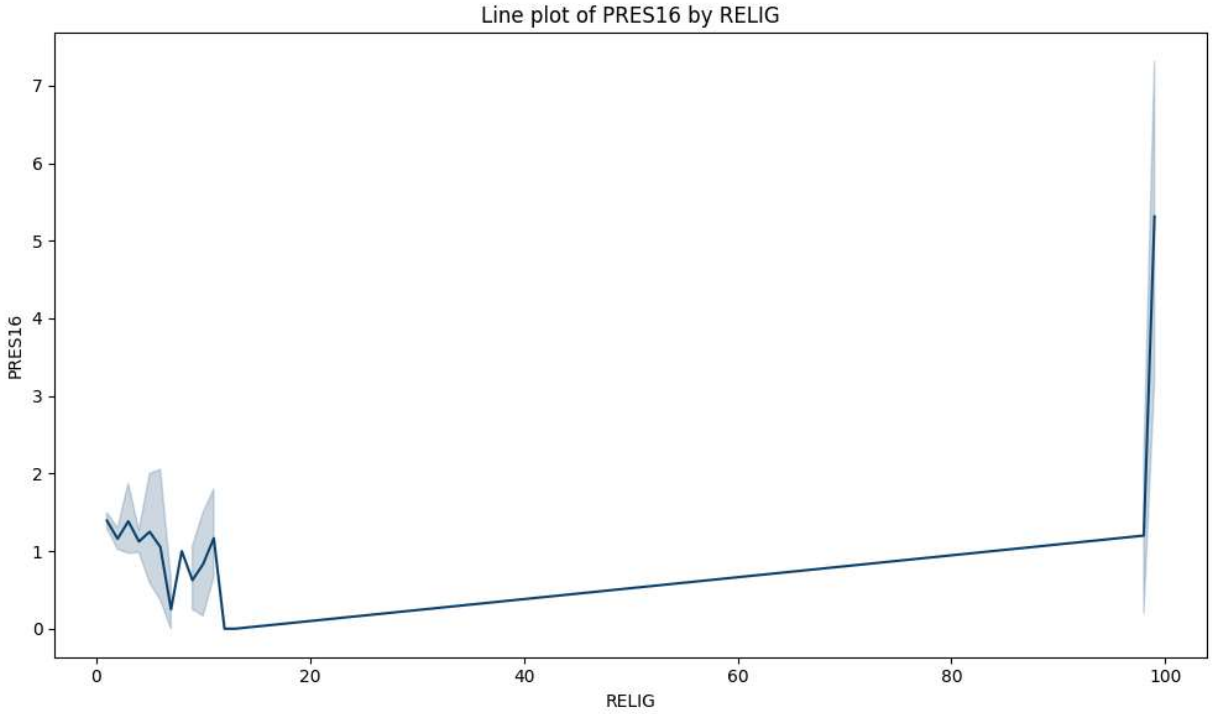
In [12]:
```
plt.figure(figsize=(8,5))
plt.hist(df['AGE'], bins=20, color='#0E4572')
plt.title('Histogram of AGE')
plt.xlabel('AGE')
plt.ylabel('Frequency')
plt.show()
```

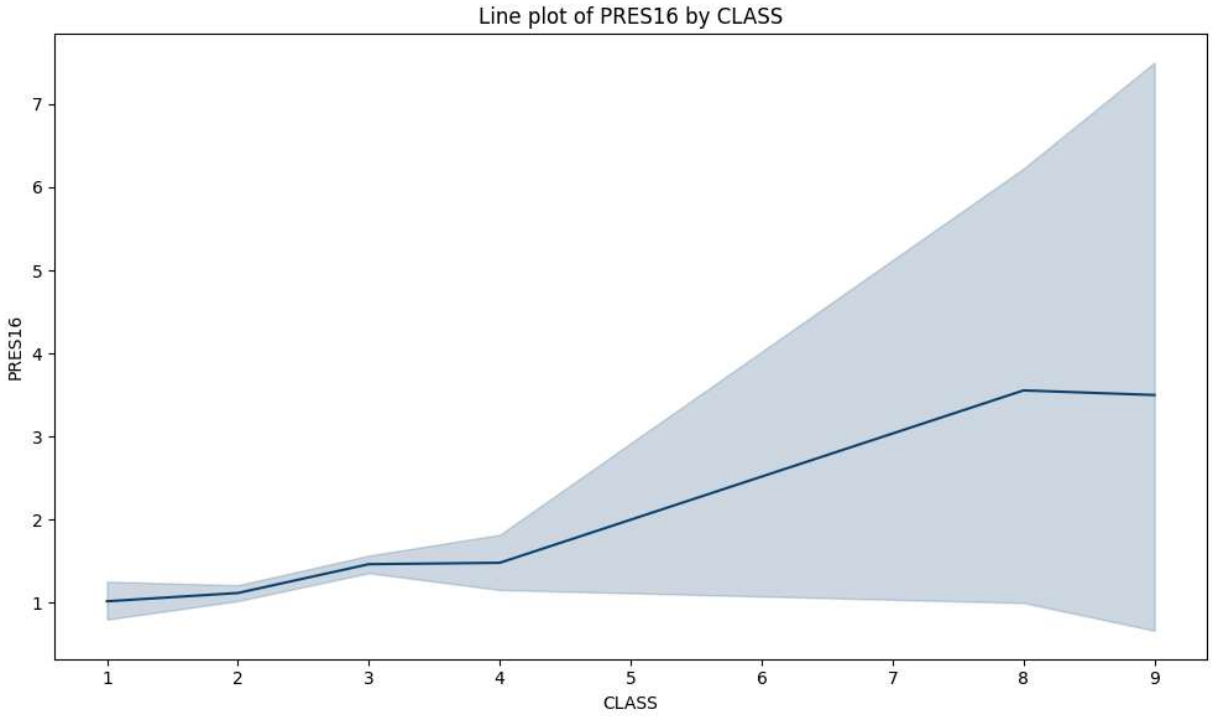


In [13]:
```
dependent_variable = 'PRES16'
independent_variables = ['PRES12', 'AGE', 'RELIG' ,'CLASS']
for independent_var in independent_variables:
    plt.figure(figsize=(10, 6))
    sns.lineplot(x=independent_var, y=dependent_variable, data=df, color='#0E4572')
    plt.title('Line plot of {} by {}'.format(dependent_variable, independent_var))
    plt.xlabel(independent_var)
    plt.ylabel(dependent_variable)
    plt.tight_layout()
    plt.show()
```


Line plot of PRES16 by PRES12
PRES16
PRES12
0
1
2
3
4
5
6
7
8
0
2
4
6
8


Line plot of PRES16 by AGE
PRES16
AGE
0
1
2
3
4
5
6
20
30
40
50
60
70
80
90
100


Line plot of PRES16 by RELIG
PRES16
RELIG
0
1
2
3
4
5
6
7
0
20
40
60
80
100


Line plot of PRES16 by CLASS
PRES16
CLASS
1
2
3
4
5
6
7
8
9