In [1]:
```
import pandas as pd
import numpy as np
import seaborn as sns
from matplotlib import pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.metrics import confusion_matrix,accuracy_score,classification_report
```

In [2]:
```
df = pd.read_csv('abcd.csv' , encoding = 'ISO-8859-1')
```

In [3]:
```
df.head()
```

Out[3]:

	v1	v2	Unnamed: 2	Unnamed: 3	Unnamed: 4
0	ham	Go until jurong point, crazy.. Available only ...	NaN	NaN	NaN
1	ham	Ok lar... Joking wif u oni...	NaN	NaN	NaN
2	spam	Free entry in 2 a wkly comp to win FA Cup fina...	NaN	NaN	NaN
3	ham	U dun say so early hor... U c already then say...	NaN	NaN	NaN
4	ham	Nah I don't think he goes to usf, he lives aro...	NaN	NaN	NaN

In [4]:
```
df.tail()
```

Out[4]:

	v1	v2	Unnamed: 2	Unnamed: 3	Unnamed: 4
5567	spam	This is the 2nd time we have tried 2 contact u...	NaN	NaN	NaN
5568	ham	Will ì_ b going to esplanade fr home?	NaN	NaN	NaN
5569	ham	Pity, * was in mood for that. So...any other s...	NaN	NaN	NaN
5570	ham	The guy did some bitching but I acted like i'd...	NaN	NaN	NaN
5571	ham	Rofl. Its true to its name	NaN	NaN	NaN

In [5]:
```
df.shape
```

Out[5]:
```
(5572, 5)
```

In [6]:
```
df.size
```

Out[6]:
```
27860
```

In [7]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5572 entries, 0 to 5571
Data columns (total 5 columns):
 #   Column      Non-Null Count  Dtype 
---  ------      --------------  ----- 
 0   v1          5572 non-null   object
 1   v2          5572 non-null   object
 2   Unnamed: 2  50 non-null     object
 3   Unnamed: 3  12 non-null     object
 4   Unnamed: 4  6 non-null      object
dtypes: object(5)
memory usage: 217.8+ KB
```

In [8]:
```
df.describe()
```

Out[8]:

	v1	v2	Unnamed: 2	Unnamed: 3	Unnamed: 4
count	5572	5572	50	12	6
unique	2	5169	43	10	5
top	ham	Sorry, I'll call later	bt not his girlfrnd... G o o d n i g h t . . .@"	MK17 92H. 450Ppw 16"	GNT:-)"
freq	4825	30	3	2	2

In [9]:
```
df.drop(columns=['Unnamed: 2','Unnamed: 3','Unnamed: 4'],inplace=True)
```

In [10]:
```
df
```

Out[10]:

	v1	v2
0	ham	Go until jurong point, crazy.. Available only ...
1	ham	Ok lar... Joking wif u oni...
2	spam	Free entry in 2 a wkly comp to win FA Cup fina...
3	ham	U dun say so early hor... U c already then say...
4	ham	Nah I don't think he goes to usf, he lives aro...
...	...	...
5567	spam	This is the 2nd time we have tried 2 contact u...
5568	ham	Will ì_ b going to esplanade fr home?
5569	ham	Pity, * was in mood for that. So...any other s...
5570	ham	The guy did some bitching but I acted like i'd...
5571	ham	Rofl. Its true to its name

5572 rows × 2 columns

In [11]:
```
df=df.rename(columns={'v1':'Target','v2':'Message'})
```

In [12]:
```
df.isnull().sum()
```

Out[12]:
```
Target     0
Message    0
dtype: int64
```

In [13]:
```
df.duplicated().sum()
```

Out[13]:
```
403
```

In [14]:
```
df.drop_duplicates(keep='first',inplace=True)
```

In [15]:
```
df.duplicated().sum()
```

Out[15]:
```
0
```

In [16]:
```
df.size
```

Out[16]:
```
10338
```

In [17]:
```
from sklearn.preprocessing import LabelEncoder
encoder=LabelEncoder()
df['Target']=encoder.fit_transform(df['Target'])
df['Target']
```

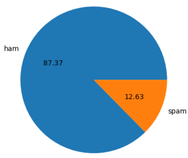
Out[17]:
```
0       0
1       0
2       1
3       0
4       0
       ..
5567    1
5568    0
5569    0
5570    0
5571    0
Name: Target, Length: 5169, dtype: int32
```

In [18]:
```
df.head()
```

Out[18]:

	Target	Message
0	0	Go until jurong point, crazy.. Available only ...
1	0	Ok lar... Joking wif u oni...
2	1	Free entry in 2 a wkly comp to win FA Cup fina...
3	0	U dun say so early hor... U c already then say...
4	0	Nah I don't think he goes to usf, he lives aro...

In [19]:
```
plt.pie(df['Target'].value_counts(), labels = ['ham', 'spam'], autopct = "%0.2f")
plt.show()
```



In [20]:
```
x=df['Message']
y=df['Target']
```

In [21]:
```
print(x)
```

```
0       Go until jurong point, crazy.. Available only ...
1                           Ok lar... Joking wif u oni...
2       Free entry in 2 a wkly comp to win FA Cup fina...
3       U dun say so early hor... U c already then say...
4       Nah I don't think he goes to usf, he lives aro...
                              ...                        
5567    This is the 2nd time we have tried 2 contact u...
5568                Will ì_ b going to esplanade fr home?
5569    Pity, * was in mood for that. So...any other s...
5570    The guy did some bitching but I acted like i'd...
5571                         Rofl. Its true to its name
Name: Message, Length: 5169, dtype: object
```

In [22]:
```
y
```

Out[22]:
```
0       0
1       0
2       1
3       0
4       0
       ..
5567    1
5568    0
5569    0
5570    0
5571    0
Name: Target, Length: 5169, dtype: int32
```

In [23]:
```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.2, random_state=3)
```

In [24]:
```
from sklearn.feature_extraction.text import CountVectorizer
from sklearn import svm
```

In [25]:
```
cv=CountVectorizer()
```

In [26]:
```
x_train_cv = cv.fit_transform(x_train)
x_test_cv = cv.transform(x_test)
```

In [27]:
```
print(x_train_cv)
```

```
  (0, 1879)     1
  (0, 1170)     1
  (0, 6840)     1
  (0, 6610)     1
  (0, 2779)     1
  (1, 1939)     1
  (1, 4467)     1
  (1, 453)      1
  (1, 7176)     1
  (1, 7594)     1
  (1, 1577)     1
  (1, 203)      1
  (1, 4768)     1
  (1, 7175)     1
  (1, 7390)     1
  (1, 7590)     1
  (1, 4309)     1
  (1, 5157)     1
  (1, 3732)     1
  (1, 3015)     1
  (1, 2333)     1
  (1, 5210)     1
  (1, 4577)     1
  (1, 4731)     1
  (1, 5615)     1
  :     :
  (4134, 3290)  2
  (4134, 4817)  1
  (4134, 1546)  1
  (4134, 4195)  1
  (4134, 891)   1
  (4134, 1092)  1
  (4134, 1261)  1
  (4134, 7302)  1
  (4134, 6595)  1
  (4134, 1624)  1
  (4134, 1977)  1
  (4134, 7438)  1
  (4134, 6189)  1
  (4134, 6815)  1
  (4134, 2357)  1
  (4134, 4093)  1
  (4134, 6583)  1
  (4134, 5934)  1
  (4134, 1661)  1
  (4134, 5153)  1
  (4134, 6292)  1
  (4134, 3707)  1
  (4134, 6172)  1
  (4134, 3624)  1
  (4134, 4785)  1
```

In [32]:
```
from sklearn.linear_model import LogisticRegression
lr=LogisticRegression()
```

In [33]:
```
lr.fit(x_train_cv,y_train)
prediction_train=lr.predict(x_train_cv)
```

In [34]:
```
from sklearn.metrics import accuracy_score
print(accuracy_score(y_train, prediction_train)*100)
```

```
99.75816203143893
```

In [36]:
```
prediction_test = lr.predict(x_test_cv)
```

In [38]:
```
from sklearn.metrics import accuracy_score
print(accuracy_score(y_test, prediction_test)*100)
```

```
97.58220502901354
```