In [1]:
```
import numpy as np
import pandas as pd
```

In [2]:
```
data = pd.read_csv("creditcard.csv")
```

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

Out[3]:

	Time	V1	V2	V3	V4	V5	V6	V7	V8	V9	...	V21	V22	V23	V24	V2
0	0.0	-1.359807	-0.072781	2.536347	1.378155	-0.338321	0.462388	0.239599	0.098698	0.363787	...	-0.018307	0.277838	-0.110474	0.066928	0.12853
1	0.0	1.191857	0.266151	0.166480	0.448154	0.060018	-0.082361	-0.078803	0.085102	-0.255425	...	-0.225775	-0.638672	0.101288	-0.339846	0.16717
2	1.0	-1.358354	-1.340163	1.773209	0.379780	-0.503198	1.800499	0.791461	0.247676	-1.514654	...	0.247998	0.771679	0.909412	-0.689281	-0.32764
3	1.0	-0.966272	-0.185226	1.792993	-0.863291	-0.010309	1.247203	0.237609	0.377436	-1.387024	...	-0.108300	0.005274	-0.190321	-1.175575	0.64737
4	2.0	-1.158233	0.877737	1.548718	0.403034	-0.407193	0.095921	0.592941	-0.270533	0.817739	...	-0.009431	0.798278	-0.137458	0.141267	-0.20601

5 rows × 31 columns

In [4]:
```
data.shape
```

Out[4]:
```
(284807, 31)
```

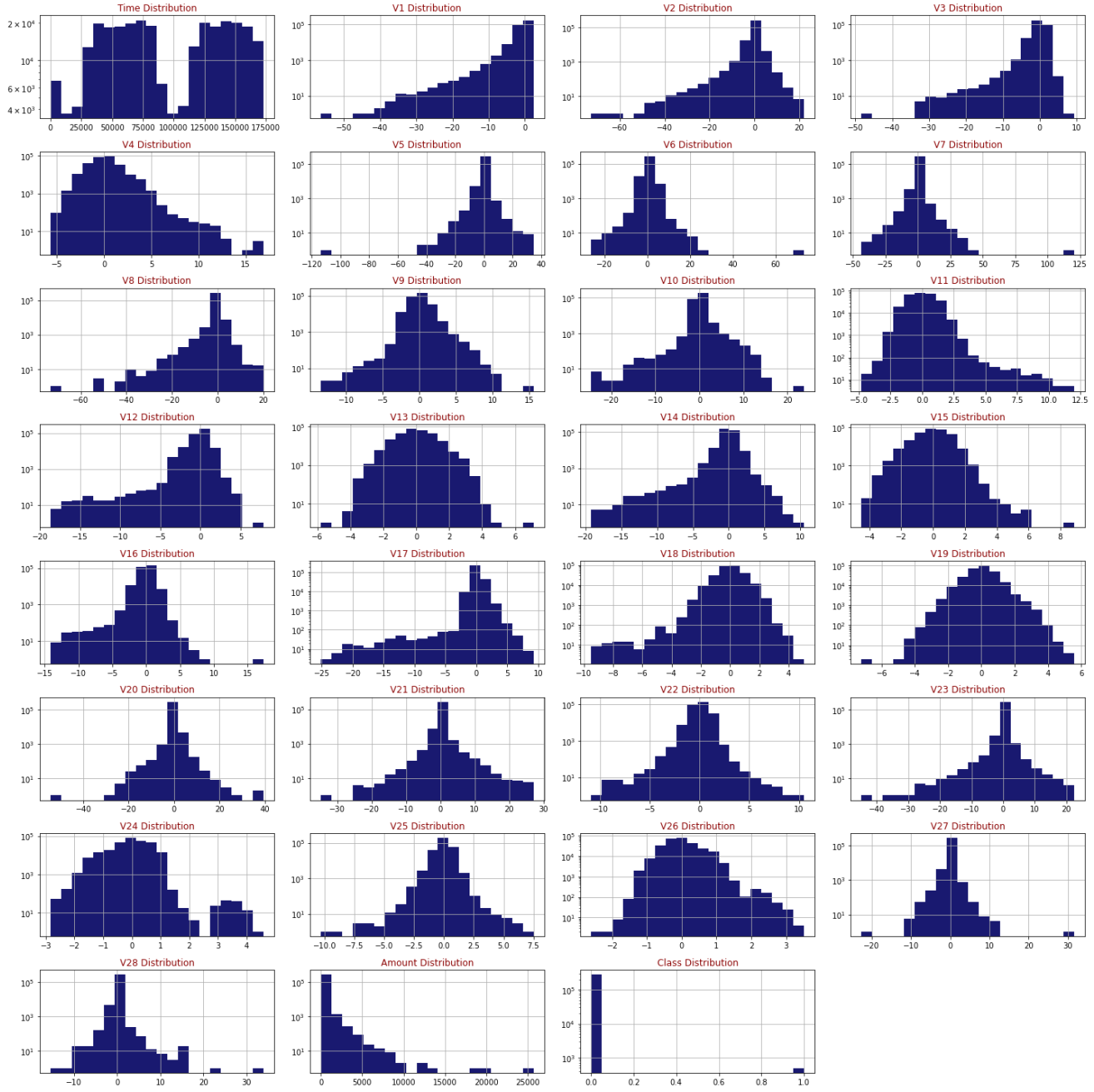
In [5]:
```
data['Class'].value_counts()
```

Out[5]:
```
0    284315
1       492
Name: Class, dtype: int64
```

In [6]:
```
import matplotlib.pyplot as plt
```

In [7]:
```
def draw_histograms(dataframe, features, rows, cols):
    fig=plt.figure(figsize=(20,20))
    for i, feature in enumerate(features):
        ax=fig.add_subplot(rows,cols,i+1)
        dataframe[feature].hist(bins=20,ax=ax,facecolor='midnightblue')
        ax.set_title(feature+" Distribution",color='DarkRed')
        ax.set_yscale('log')
    fig.tight_layout()
    plt.show()

draw_histograms(data,data.columns,8,4)
```



In [8]:
```
x = data.drop("Class",axis = 1)
y = data.Class
```

In [9]:
```
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score, confusion_matrix, classification_report
import numpy as np
from sklearn.model_selection import KFold
from sklearn.model_selection import GridSearchCV
```

In [10]:
```
lr=LogisticRegression(C=1, penalty='l1', solver='liblinear')
grid={'C':10.0 **np.arange(-2,3),'penalty':['l1','l2']}
cv=KFold(n_splits=5,random_state=None,shuffle=False)
```

In [11]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test = train_test_split(x,y,train_size = 0.75)
```

In [12]:
```
clf=GridSearchCV(lr,grid,cv=cv,n_jobs=-1,scoring='f1_macro')
clf.fit(x_train,y_train)
```

Out[12]:
```
GridSearchCV(cv=KFold(n_splits=5, random_state=None, shuffle=False),
             estimator=LogisticRegression(C=1, penalty='l1',
                                          solver='liblinear'),
             n_jobs=-1,
             param_grid={'C': array([1.e-02, 1.e-01, 1.e+00, 1.e+01, 1.e+02]),
                         'penalty': ['l1', 'l2']},
             scoring='f1_macro')
```

In [13]:
```
y_pred = clf.predict(x_test)
```

In [19]:
```
import seaborn as sns
```

In [20]:
```
cm=confusion_matrix(y_test,y_pred)
conf_matrix=pd.DataFrame(data=cm,columns=['Predicted:0','Predicted:1'],index=['Actual:0','Actual:1'])
plt.figure(figsize = (8,5))
sns.heatmap(conf_matrix, annot=True,fmt='d',cmap="YlGnBu");
```