Homework Week 3 - Jon Workman

In [263]:

```
from datetime import date
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
from matplotlib import pyplot as plt
import seaborn as sns
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import classification_report, confusion_matrix
from sklearn.metrics import roc_curve
%matplotlib inline
```

In [264]:

```
df = pd.read_csv('seattleWeather_1948-2017.csv').dropna()
```

Clean data and add feature

In [265]:

```
df.RAIN = df.RAIN.astype(int)
df['DATE'] =  pd.to_datetime(df['DATE'], format='%Y-%m-%d')
df['DAY'] = df['DATE'].apply(date.isoweekday)
```

In [266]:

```
df.head()
```

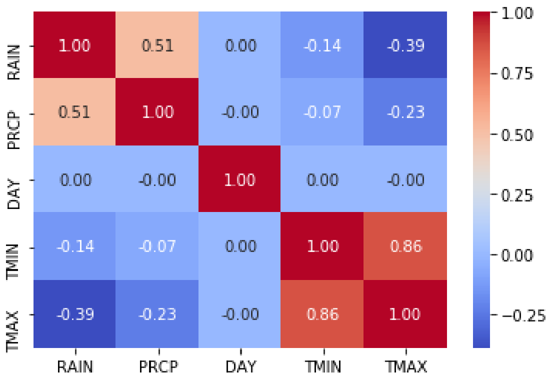
Out[266]:

	DATE	PRCP	TMAX	TMIN	RAIN	DAY
0	1948-01-01	0.47	51	42	1	4
1	1948-01-02	0.59	45	36	1	5
2	1948-01-03	0.42	45	35	1	6
3	1948-01-04	0.31	45	34	1	7
4	1948-01-05	0.17	45	32	1	1

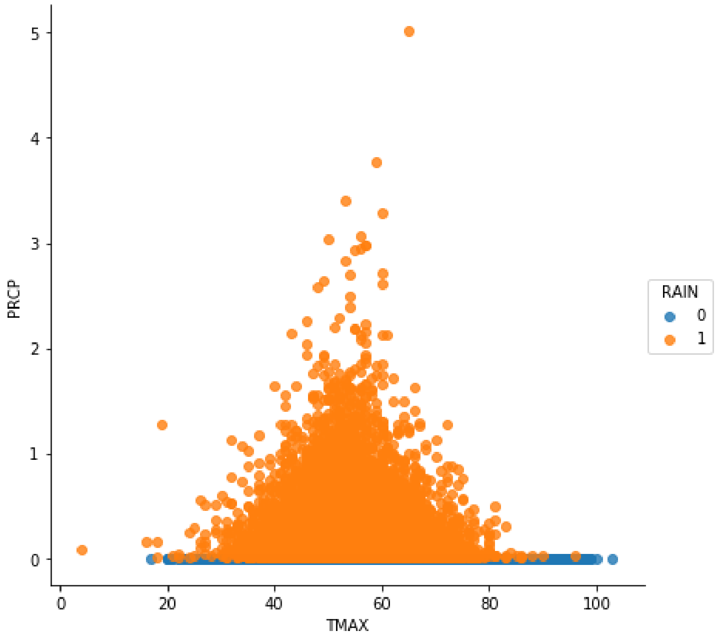
Visualisation

In [267]:

```
g = sns.heatmap(df_train[['RAIN', 'PRCP','DAY','TMIN','TMAX']].corr(),annot=True, fmt = ".2f",
cmap = "coolwarm")
```



```
In [268]: g = sns.lmplot(x='TMAX', y= 'PRCP', data=df, fit_reg=False, hue='RAIN', size=6)
```



Split dataset

```
In [269]: start1 = pd.datetime(1950, 1, 1)
          end1 = pd.datetime(2009, 12, 31)
          start2 = pd.datetime(2010,1,1)
          end2 = pd.datetime(2017,12,31)

          df_train = df[(df.DATE >= start1) & (df.DATE <= end1)]
          df_validation = df[(df.DATE >= start2) & (df.DATE <= end2)]
```

```
In [270]: df_train.shape

Out[270]: (21912, 6)
```

```
In [271]: df_validation.shape

Out[271]: (2905, 6)
```

Train and test

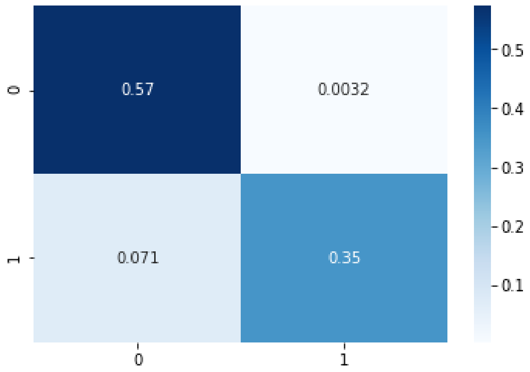
```
In [272]: X_train, X_test, y_train, y_test = train_test_split(df_train.drop(['DATE', 'DAY', 'RAIN'],axis=
          1),df_train['RAIN'],
          test_size=0.30, random_state=0)
```

```
In [273]: logmodel = LogisticRegression()
          logmodel.fit(X_train,y_train)

Out[273]: LogisticRegression(C=1.0, class_weight=None, dual=False, fit_intercept=True,
                    intercept_scaling=1, max_iter=100, multi_class='ovr', n_jobs=1,
                    penalty='l2', random_state=None, solver='liblinear', tol=0.0001,
                    verbose=0, warm_start=False)
```

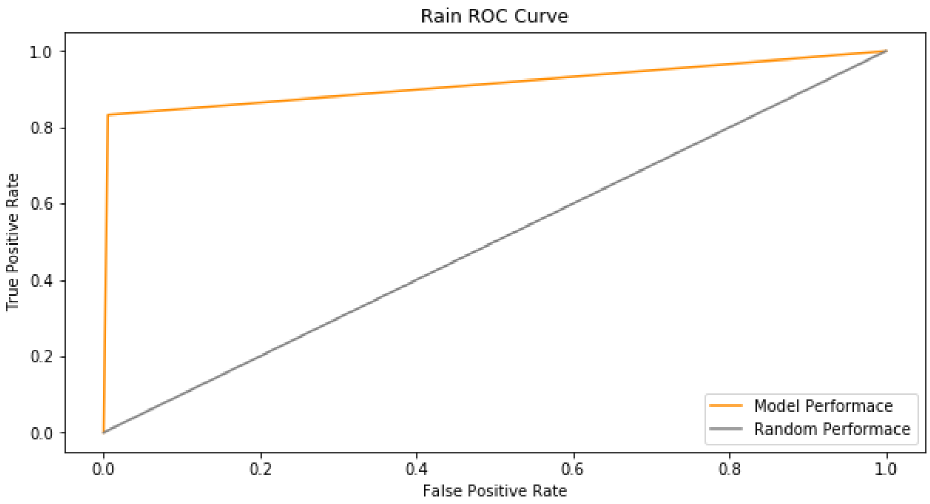
```
In [274]: logpredictions = logmodel.predict(X_test)
```

```
In [275]: print(accuracy_score(y_test,logpredictions))

          0.92576817767
```

```
In [276]: print(confusion_matrix(y_test,logpredictions))
          sns.heatmap(confusion_matrix(y_test, logpredictions) / len(y_test), cmap='Blues', annot=True)

          [[3769   21]
           [ 467 2317]]

Out[276]: <matplotlib.axes._subplots.AxesSubplot at 0x1a23553cc0>
```



```
In [277]: fpr, tpr, thresholds = roc_curve(y_test, logpredictions)

          fig, ax = plt.subplots(1, figsize=(10, 5))
          plt.plot(fpr, tpr, color='darkorange', label='Model Performace')
          plt.plot([0, 1], [0, 1], color='gray', label='Random Performace')
          plt.xlabel('False Positive Rate')
          plt.ylabel('True Positive Rate')
          plt.title('Rain ROC Curve')
          plt.legend(loc="lower right")

Out[277]: <matplotlib.legend.Legend at 0x1a23465198>
```



```
In [278]: print(classification_report(y_test,logpredictions))

                       precision    recall  f1-score   support

                    0       0.89      0.99      0.94      3790
                    1       0.99      0.83      0.90      2784

          avg / total       0.93      0.93      0.92      6574
```

Validation

```
In [279]: X_train2, X_test2, y_train2, y_test2 = train_test_split(df_validation.drop(['DATE', 'DAY', 'RAI
          N'],axis=1),df_validation['RAIN'],
          test_size=0.30,random_state=0)
```

```
In [280]: logmodel2 = LogisticRegression()
          logmodel2.fit(X_train2,y_train2)
```

```
Out[280]: LogisticRegression(C=1.0, class_weight=None, dual=False, fit_intercept=True,
                    intercept_scaling=1, max_iter=100, multi_class='ovr', n_jobs=1,
                    penalty='l2', random_state=None, solver='liblinear', tol=0.0001,
                    verbose=0, warm_start=False)
```

```
In [281]: logpredictions2 = logmodel2.predict(X_test2)
```

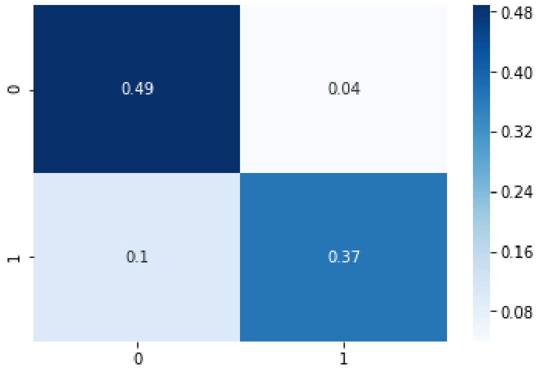
```
In [282]: print(accuracy_score(y_test2,logpredictions2))
```

```
          0.857798165138
```

```
In [283]: print(confusion_matrix(y_test2,logpredictions2))
          sns.heatmap(confusion_matrix(y_test2, logpredictions2) / len(y_test2), cmap='Blues', annot=True
          )
```

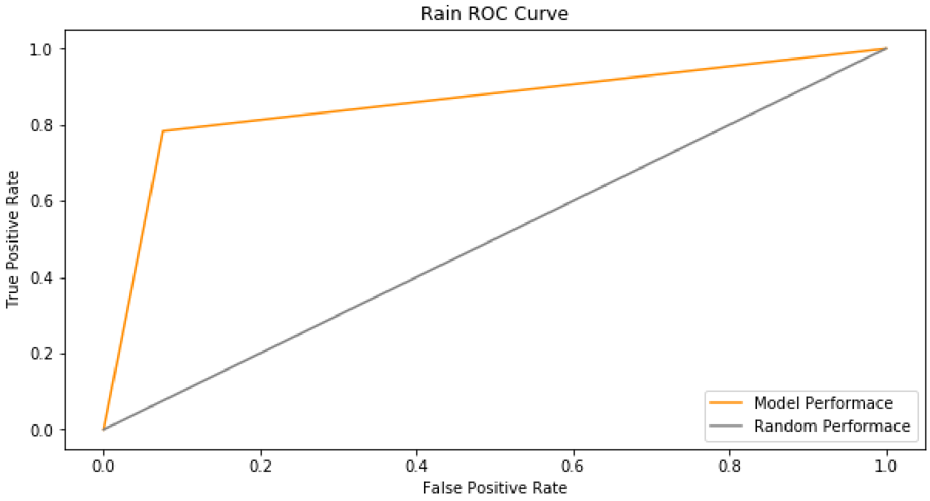
```
          [[426  35]
           [ 89 322]]
```

```
Out[283]: <matplotlib.axes._subplots.AxesSubplot at 0x1a23477908>
```



```
In [284]: fpr, tpr, thresholds = roc_curve(y_test2, logpredictions2)

          fig, ax = plt.subplots(1, figsize=(10, 5))
          plt.plot(fpr, tpr, color='darkorange', label='Model Performace')
          plt.plot([0, 1], [0, 1], color='gray', label='Random Performace')
          plt.xlabel('False Positive Rate')
          plt.ylabel('True Positive Rate')
          plt.title('Rain ROC Curve')
          plt.legend(loc="lower right")
```

```
Out[284]: <matplotlib.legend.Legend at 0x1a2163eda0>
```



```
In [285]: print(classification_report(y_test2,logpredictions2))
```

```
             precision    recall  f1-score   support

          0       0.83      0.92      0.87       461
          1       0.90      0.78      0.84       411

avg / total       0.86      0.86      0.86       872
```