Analysis

July 3, 2023

[51]:
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import statsmodels.api as sm
import statsmodels.formula.api as smf
import numpy as np
from sklearn import metrics
```

[52]:
```
df = pd.read_csv('diabetes-dataset.csv')
df = df.rename(columns={'Outcome': 'DiabetesOutcome'})
```

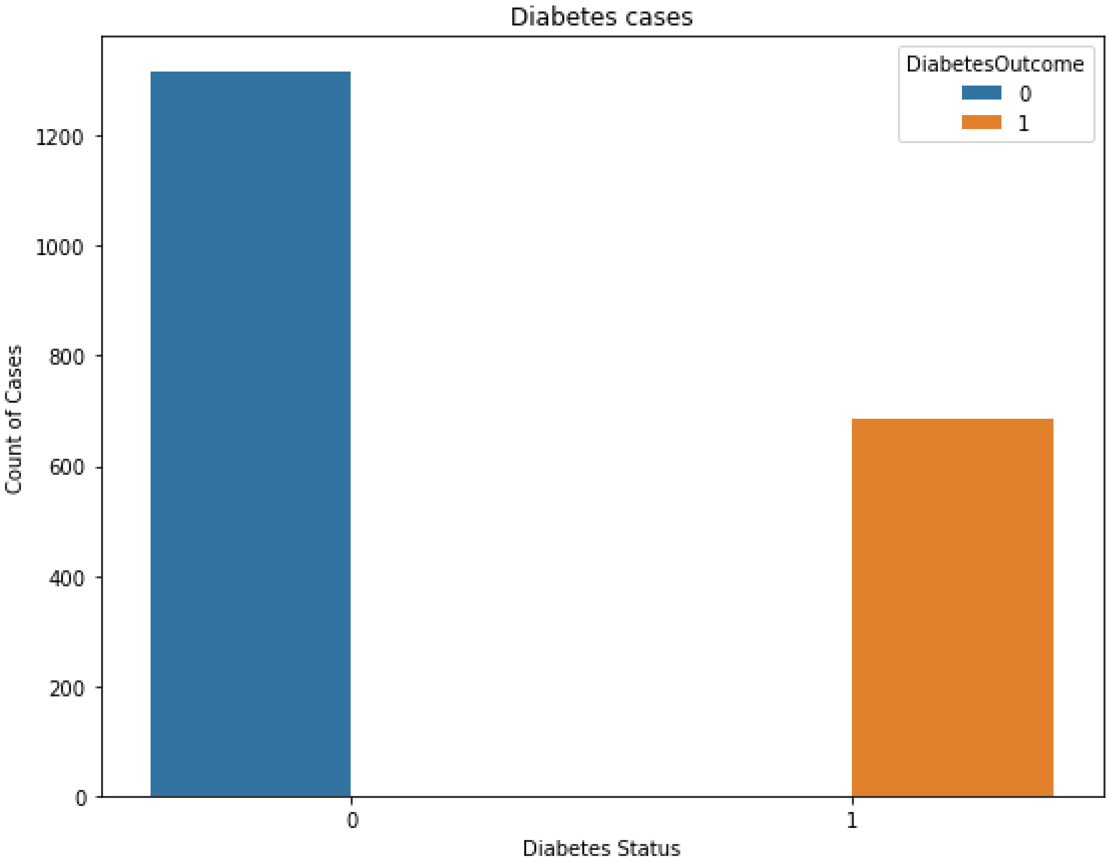
[53]:
```
df.describe()
```

[53]:
```
       Pregnancies      Glucose  BloodPressure  SkinThickness      Insulin  \
count  2000.000000  2000.000000    2000.000000    2000.000000  2000.000000
mean      3.703500   121.182500      69.145500      20.935000    80.254000
std       3.306063    32.068636      19.188315      16.103243   111.180534
min       0.000000     0.000000       0.000000       0.000000     0.000000
25%       1.000000    99.000000      63.500000       0.000000     0.000000
50%       3.000000   117.000000      72.000000      23.000000    40.000000
75%       6.000000   141.000000      80.000000      32.000000   130.000000
max      17.000000   199.000000     122.000000     110.000000   744.000000

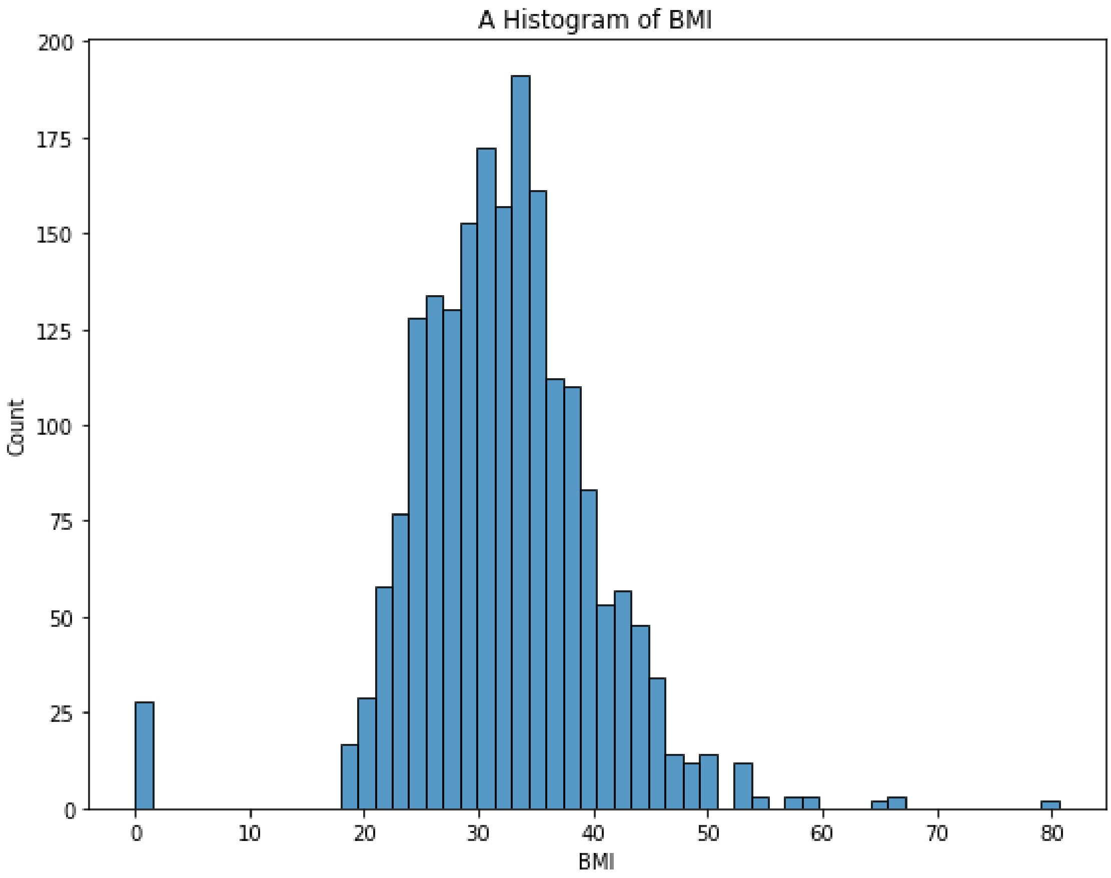
               BMI  DiabetesPedigreeFunction          Age  DiabetesOutcome
count  2000.000000               2000.000000  2000.000000      2000.000000
mean     32.193000                  0.470930    33.090500         0.342000
std       8.149901                  0.323553    11.786423         0.474498
min       0.000000                  0.078000    21.000000         0.000000
25%      27.375000                  0.244000    24.000000         0.000000
50%      32.300000                  0.376000    29.000000         0.000000
75%      36.800000                  0.624000    40.000000         1.000000
max      80.600000                  2.420000    81.000000         1.000000
```

[54]:
```
plt.figure(figsize=(9,7))
sns.countplot(x='DiabetesOutcome', hue='DiabetesOutcome', data=df).
 ↪set(title='Diabetes cases', ylabel='Count of Cases', xlabel='Diabetes␣
 ↪Status')
```

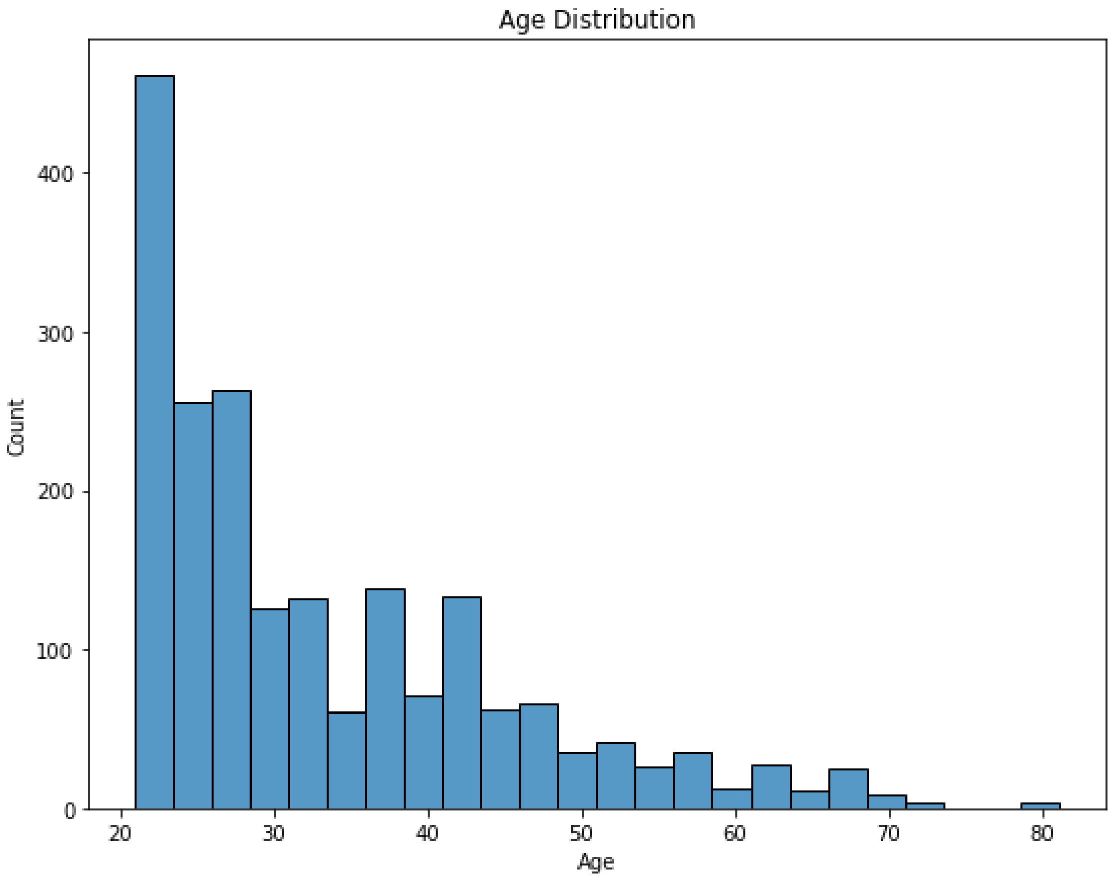
```
plt.show()
```



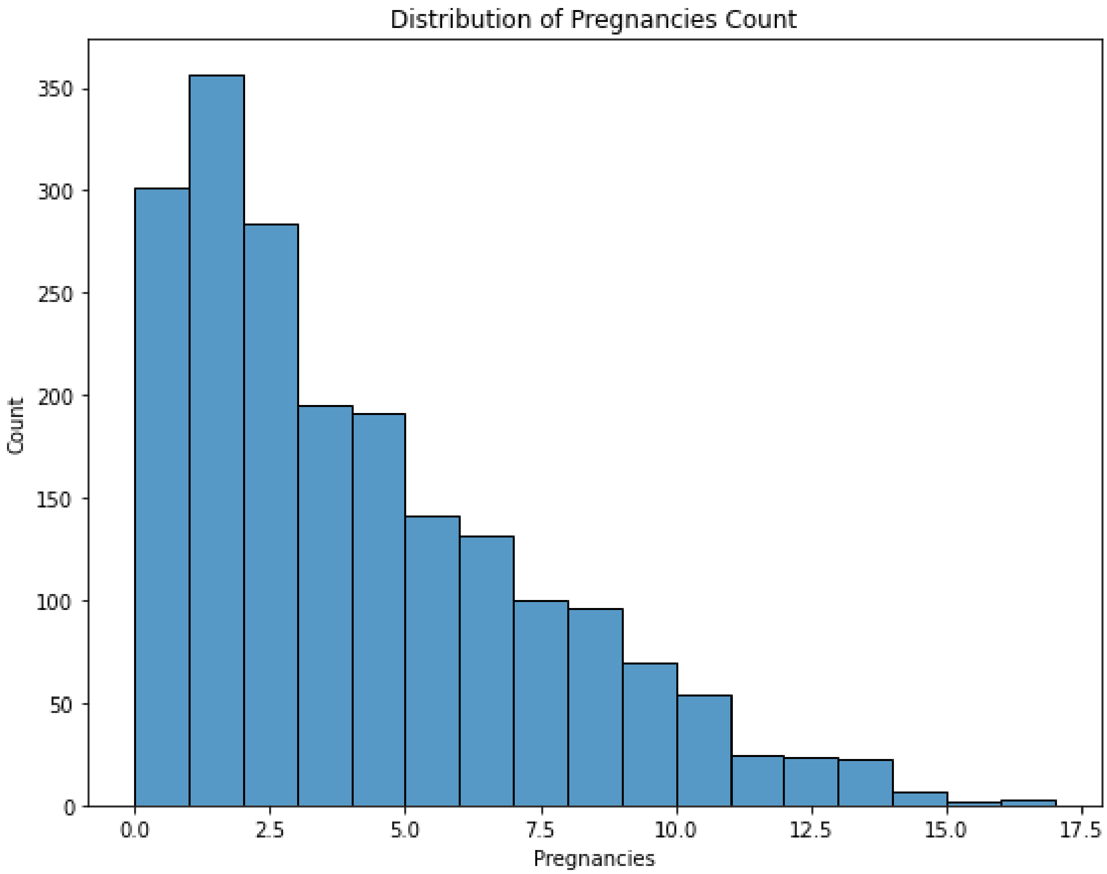
[55]:
```
plt.figure(figsize=(9,7))
sns.histplot(x='BMI', data=df).set(title='A Histogram of BMI', ylabel='Count',␣
  ↪xlabel='BMI')
plt.show()
```



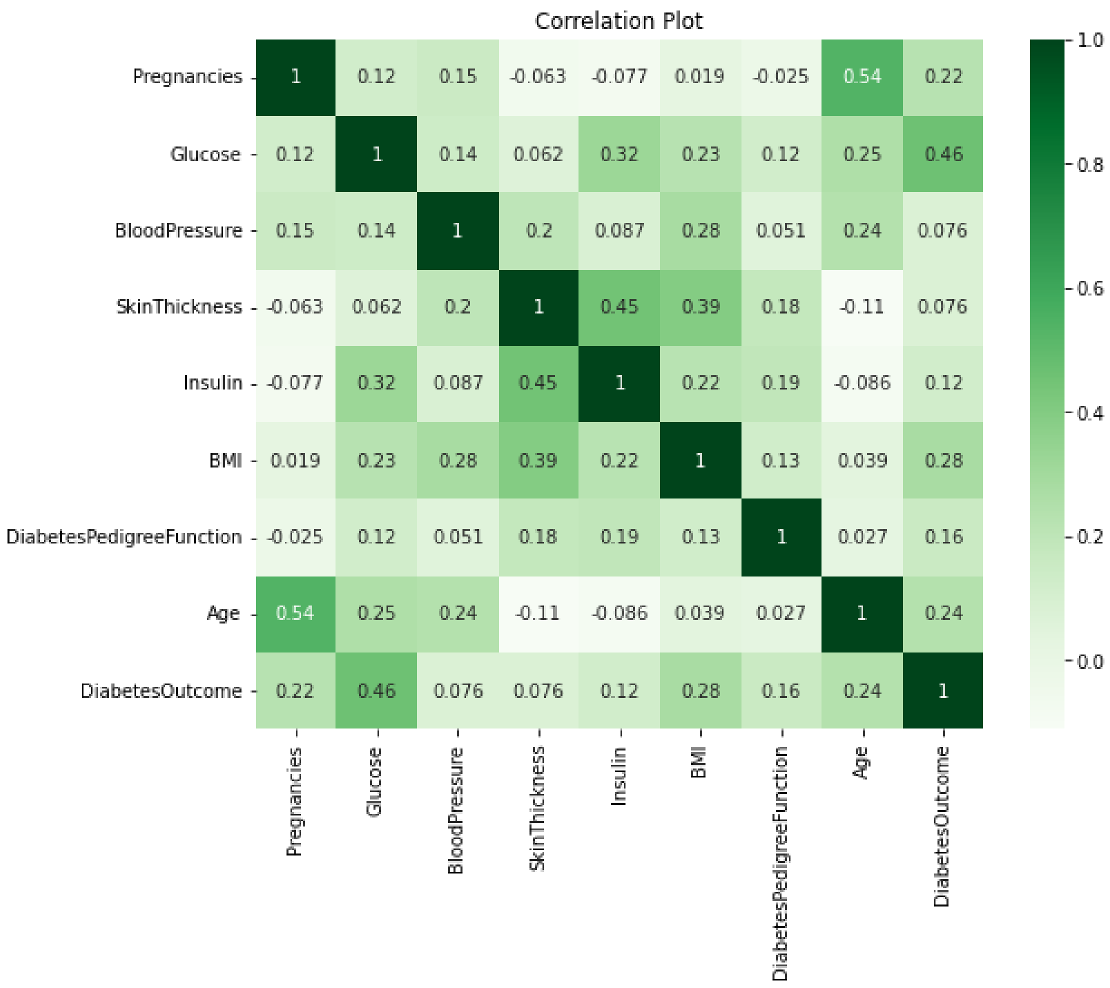
[56]:
```
plt.figure(figsize=(9,7))
sns.histplot(x='Age', data=df).set(title='Age Distribution', ylabel='Count',␣
  ↪xlabel='Age')
plt.show()
```



[57]:
```
plt.figure(figsize=(9,7))
sns.histplot(x='Pregnancies', binwidth=1, data=df).set(title='Distribution of␣
  ↪Pregnancies Count', ylabel='Count', xlabel='Pregnancies')
plt.show()
```

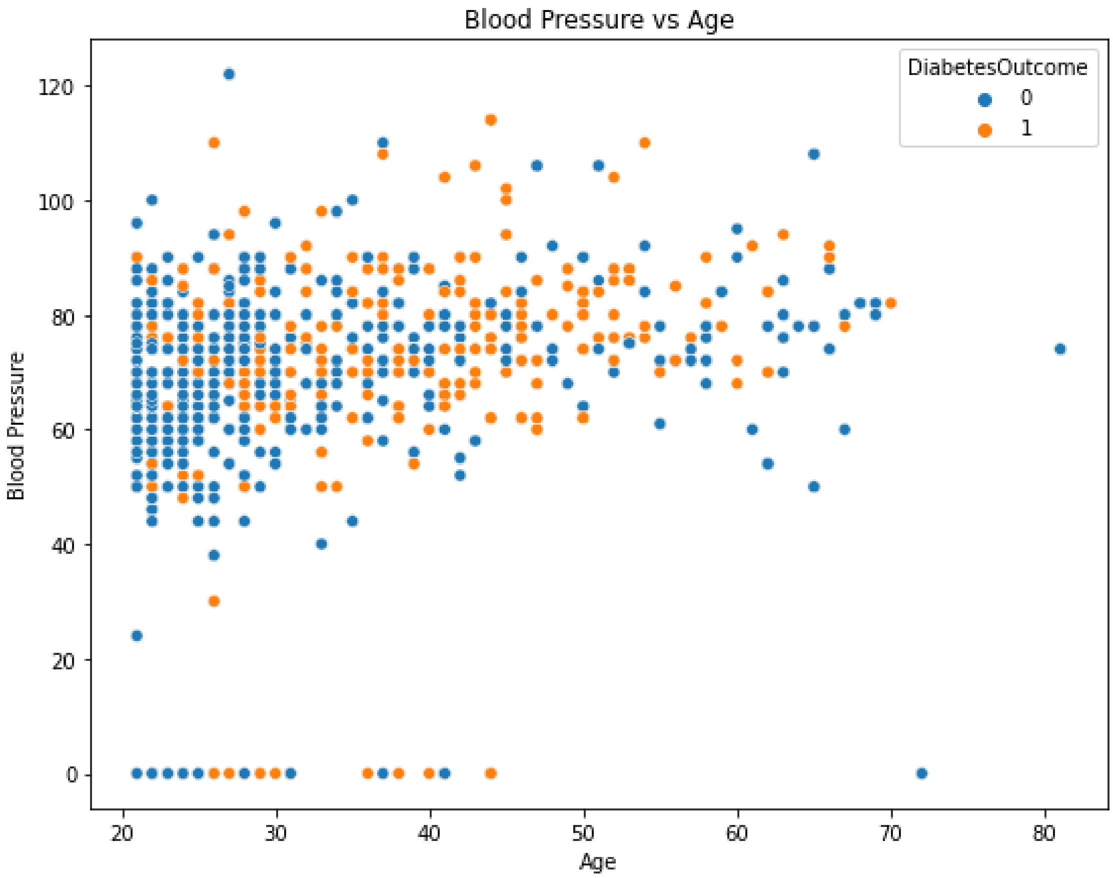


[58]:
```
corr = df.corr()
plt.figure(figsize=(9,7))
sns.heatmap(corr, xticklabels=corr.columns.values, yticklabels=corr.columns.
 ↪values, cmap="Greens", annot=True).set(title='Correlation Plot')
plt.show()
```



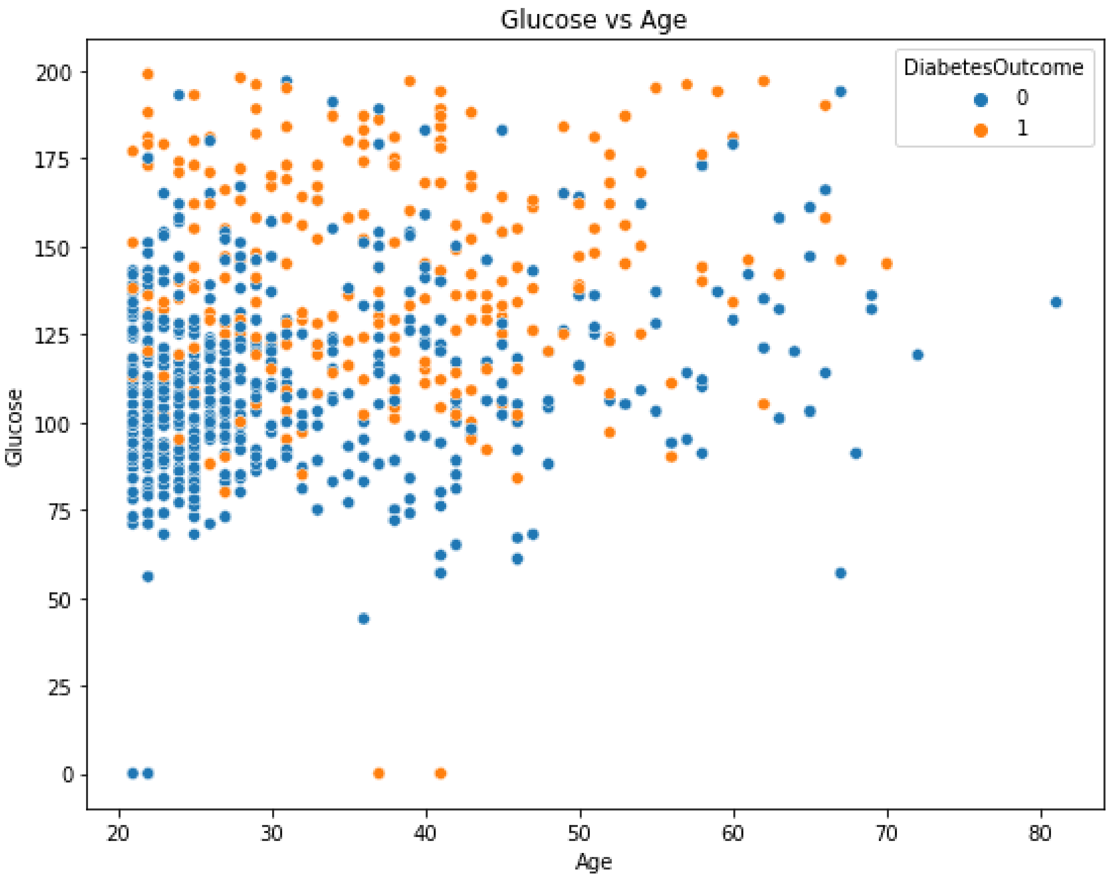
[59]:

```
plt.figure(figsize=(9,7))
sns.scatterplot(df, y='BloodPressure', x='Age', hue='DiabetesOutcome').
  ↪set(title='Blood Pressure vs Age', ylabel='Blood Pressure', xlabel='Age')
plt.show()
```

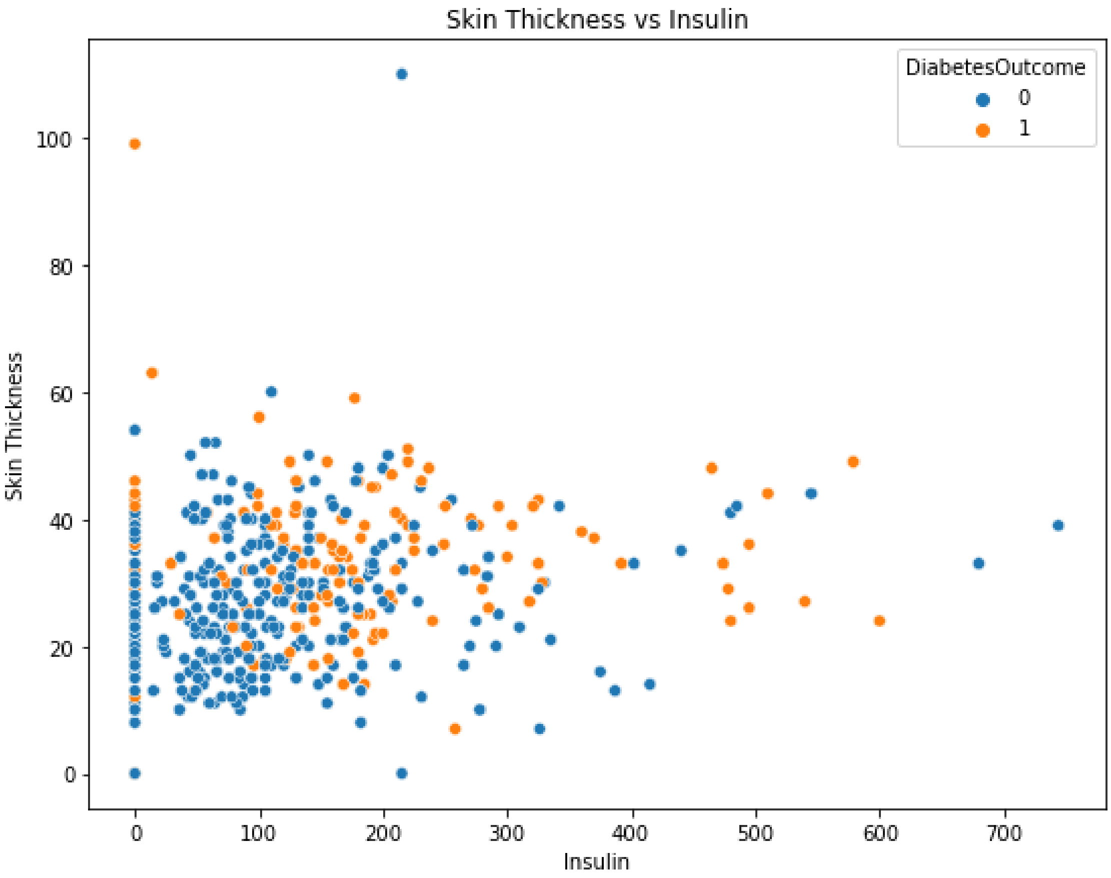


[60]:

```
plt.figure(figsize=(9,7))
sns.scatterplot(df, y='Glucose', x='Age', hue='DiabetesOutcome').
  ↪set(title='Glucose vs Age', ylabel='Glucose', xlabel='Age')
plt.show()
```



[61]:
```
plt.figure(figsize=(9,7))
sns.scatterplot(df, y='SkinThickness', x='Insulin', hue='DiabetesOutcome').
  ↪set(title='Skin Thickness vs Insulin', ylabel='Skin Thickness',␣
  ↪xlabel='Insulin')
plt.show()
```



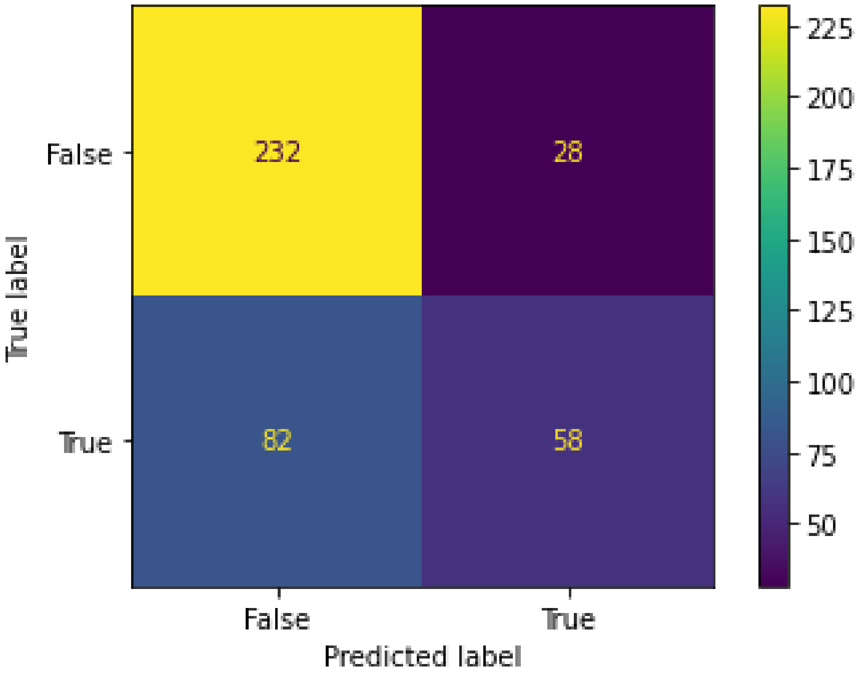
```
[62]: df_train = df.sample(round(len(df)*0.8))
      df_test = df.drop(df_train.index)
```

```
[63]: formula = 'DiabetesOutcome ~␣
       ↪Pregnancies+Glucose+BloodPressure+SkinThickness+Insulin+BMI+DiabetesPedigreeFunction+Age'
```

```
[64]: model = smf.glm(formula=formula, data=df_train, family=sm.families.Poisson())
      result = model.fit()
```

```
[65]: result = result.predict(df_test)
      result[result > 0.5] = 1
      result[result <= 0.5] = 0
```

```
[66]: confusion_matrix = metrics.confusion_matrix(df_test.DiabetesOutcome, result)
      cm_display = metrics.ConfusionMatrixDisplay(confusion_matrix =␣
       ↪confusion_matrix, display_labels = [False, True])
      cm_display.plot()
      plt.show()
```



```
[ ]:
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```
[67]: accuracy = metrics.accuracy_score(df_test.DiabetesOutcome, result)
      print(accuracy)
```

```
0.725
```

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[ ]:
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