In [1]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

from sklearn.model_selection import train_test_split

from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.linear_model import LogisticRegression

from sklearn.metrics import accuracy_score, classification_report
```

In [2]:
```
data = pd.read_csv("C:/Users/User/Downloads/diabetes (2).csv")
```

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

Out[3]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction
0	6	148	72	35	0	33.6	0.627
1	1	85	66	29	0	26.6	0.351
2	8	183	64	0	0	23.3	0.672
3	1	89	66	23	94	28.1	0.167
4	0	137	40	35	168	43.1	2.288

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

Out[4]:
```
<bound method NDFrame.describe of      Pregnancies  Glucose  BloodPressure  S
kinThickness  Insulin   BMI  \
0              6      148             72             35        0  33.6
1              1       85             66             29        0  26.6
2              8      183             64              0        0  23.3
3              1       89             66             23       94  28.1
4              0      137             40             35      168  43.1
..           ...      ...            ...            ...      ...   ...
763           10      101             76             48      180  32.9
764            2      122             70             27        0  36.8
765            5      121             72             23      112  26.2
766            1      126             60              0        0  30.1
767            1       93             70             31        0  30.4

     DiabetesPedigreeFunction  Age  Outcome
0                       0.627   50        1
1                       0.351   31        0
2                       0.672   32        1
3                       0.167   21        0
4                       2.288   33        1
..                        ...  ...      ...
763                     0.171   63        0
764                     0.340   27        0
765                     0.245   30        0
766                     0.349   47        1
767                     0.315   23        0

[768 rows x 9 columns]>
```

In [5]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 768 entries, 0 to 767
Data columns (total 9 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Pregnancies               768 non-null    int64  
 1   Glucose                   768 non-null    int64  
 2   BloodPressure             768 non-null    int64  
 3   SkinThickness             768 non-null    int64  
 4   Insulin                   768 non-null    int64  
 5   BMI                       768 non-null    float64
 6   DiabetesPedigreeFunction  768 non-null    float64
 7   Age                       768 non-null    int64  
 8   Outcome                   768 non-null    int64  
dtypes: float64(2), int64(7)
memory usage: 54.1 KB
```

In [6]:
```
data.columns
```

Out[6]:
```
Index(['Pregnancies', 'Glucose', 'BloodPressure', 'SkinThickness', 'Insulin',
       'BMI', 'DiabetesPedigreeFunction', 'Age', 'Outcome'],
      dtype='object')
```

In [7]:

```
data.isnull()
```

Out[7]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFuncti
0	False	False	False	False	False	False	Fa
1	False	False	False	False	False	False	Fa
2	False	False	False	False	False	False	Fa
3	False	False	False	False	False	False	Fa
4	False	False	False	False	False	False	Fa
...	...	...	...	...	...	...	
763	False	False	False	False	False	False	Fa
764	False	False	False	False	False	False	Fa
765	False	False	False	False	False	False	Fa
766	False	False	False	False	False	False	Fa
767	False	False	False	False	False	False	Fa

768 rows × 9 columns

In [8]:

```
data.nunique()
```

Out[8]:

```
Pregnancies                  17
Glucose                     136
BloodPressure                47
SkinThickness                51
Insulin                     186
BMI                         248
DiabetesPedigreeFunction    517
Age                          52
Outcome                       2
dtype: int64
```

In [9]:

```
np.sum(data.isnull().any(axis=1))
```

Out[9]:

```
0
```

In [10]:

```
data.Pregnancies.value_counts()
```

Out[10]:

```
Pregnancies
1     135
0     111
2     103
3      75
4      68
5      57
6      50
7      45
8      38
9      28
10     24
11     11
13     10
12      9
14      2
15      1
17      1
Name: count, dtype: int64
```

In [11]:

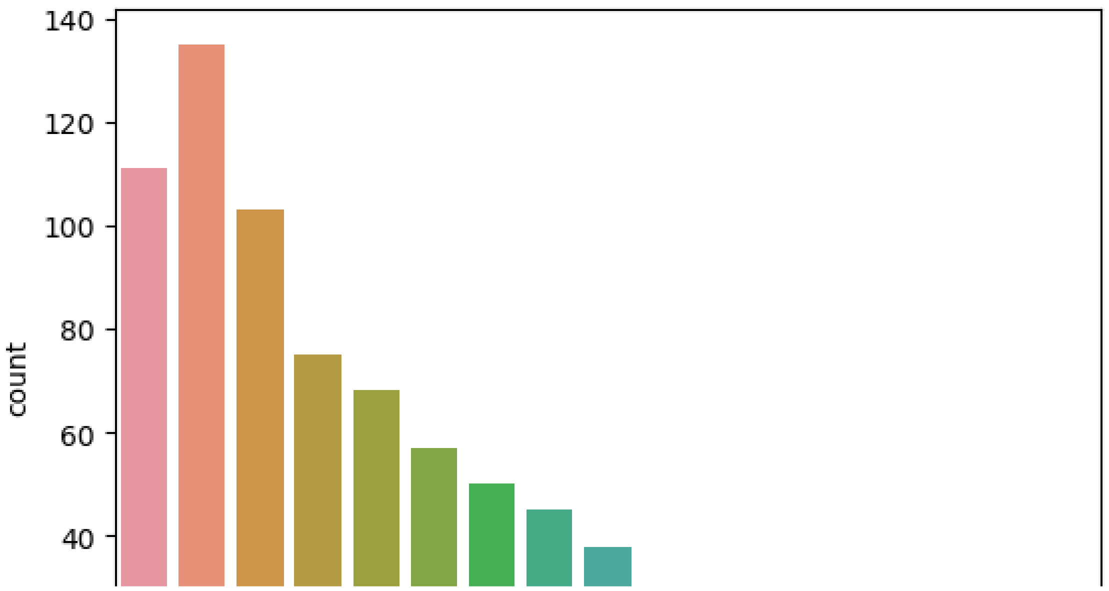
```
data['SkinThickness'] = data['SkinThickness'].replace(0, np.nan)  # Replace ze
data['Insulin'] = data['Insulin'].replace(0, np.nan)  # Replace zero insulin l
data.fillna(data.median(), inplace=True)
```

In [12]:

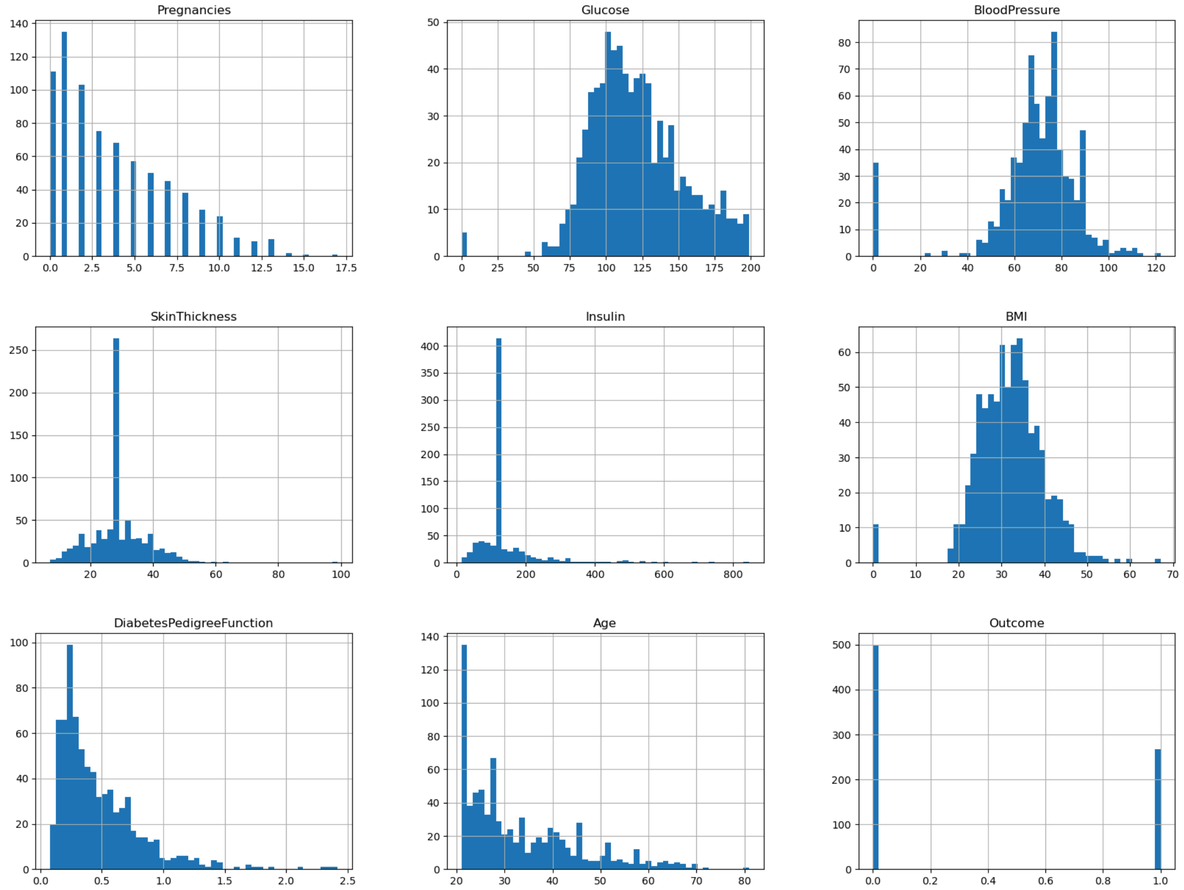
```
sns.countplot(x='Pregnancies', data=data)
```

Out[12]:

```
<Axes: xlabel='Pregnancies', ylabel='count'>
```



In [13]:
```
data.hist(bins =50, figsize=(20,15))
plt.show()
```

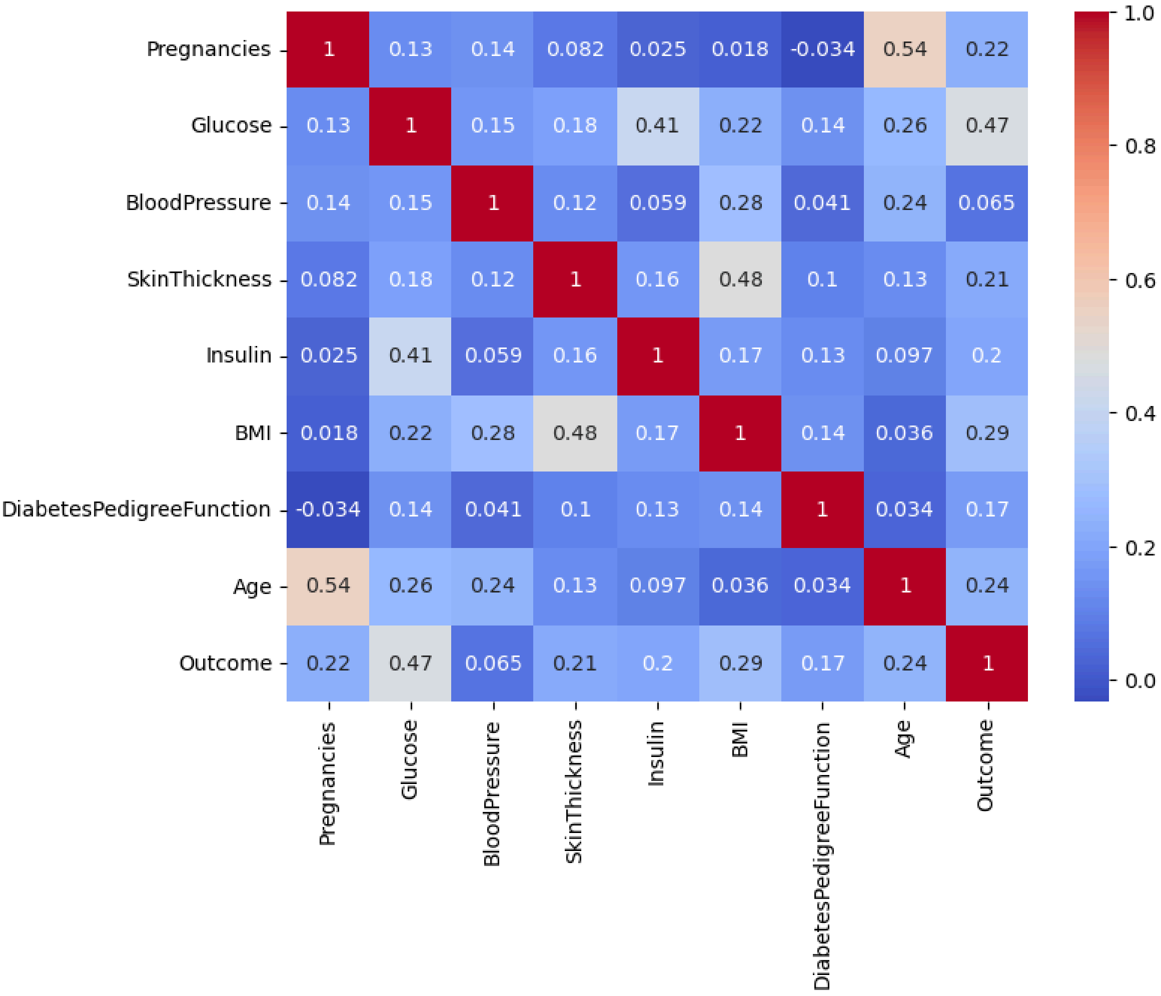


In [14]:
```
corr_matrix = data.corr()
corr_matrix['Outcome'].sort_values(ascending=False)
```

Out[14]:
```
Outcome                     1.000000
Glucose                     0.466581
BMI                         0.292695
Age                         0.238356
Pregnancies                 0.221898
SkinThickness               0.214873
Insulin                     0.203790
DiabetesPedigreeFunction    0.173844
BloodPressure               0.065068
Name: Outcome, dtype: float64
```

In [15]:

```
plt.figure(figsize=(8,6))
sns.heatmap(corr_matrix, annot = True, cmap ='coolwarm')
plt.show()
```



In [16]:

```
y = data['Outcome']
```

In [17]:

```
X = data.drop('Outcome', axis=1)
```

In [18]:

```
#Splitting Data for training and testing in two parts

X_train,X_test,y_train,y_test = train_test_split(X,y,test_size =0.2, random_st
```

In [19]:

```
from sklearn.preprocessing import StandardScaler
scaler =StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.transform(X_test)
```

In [20]:

```
dt_model = DecisionTreeClassifier()
dt_model.fit(X_train_scaled, y_train)
y_pred_dt = dt_model.predict(X_test_scaled)

# Evaluate Decision Tree
print("Decision Tree Accuracy:", accuracy_score(y_test, y_pred_dt))
print("Decision Tree Classification Report:\n", classification_report(y_test,
```

```
Decision Tree Accuracy: 0.6818181818181818
Decision Tree Classification Report:
               precision    recall  f1-score   support

           0       0.75      0.77      0.76       100
           1       0.55      0.52      0.53        54

    accuracy                           0.68       154
   macro avg       0.65      0.64      0.65       154
weighted avg       0.68      0.68      0.68       154
```

In [21]:

```
rf_model = RandomForestClassifier()
rf_model.fit(X_train_scaled, y_train)
y_pred_dt = rf_model.predict(X_test_scaled)
# Evaluate Random Forest
print("Random Forest Accuracy:", accuracy_score(y_test, y_pred_dt))
print("Random Forest Classification Report:\n", classification_report(y_test,
```

```
Random Forest Accuracy: 0.7987012987012987
Random Forest Classification Report:
               precision    recall  f1-score   support

           0       0.84      0.85      0.85       100
           1       0.72      0.70      0.71        54

    accuracy                           0.80       154
   macro avg       0.78      0.78      0.78       154
weighted avg       0.80      0.80      0.80       154
```

In [22]:

```
lr_model = LogisticRegression()
lr_model.fit(X_train_scaled, y_train)
y_pred_dt = lr_model.predict(X_test_scaled)
# Evaluate Logistic Regression
print("Logistic Regression Accuracy:", accuracy_score(y_test, y_pred_dt))
print("Logistic Regression Classification Report:\n", classification_report(y_
```

```
Logistic Regression Accuracy: 0.7922077922077922
Logistic Regression Classification Report:
               precision    recall  f1-score   support

           0       0.82      0.87      0.84       100
           1       0.73      0.65      0.69        54

    accuracy                           0.79       154
   macro avg       0.77      0.76      0.77       154
weighted avg       0.79      0.79      0.79       154
```

In [ ]:

In [23]:

```
data.to_csv('data.csv')
```