```
     MODELYEAR    MAKE         MODEL VEHICLECLASS  ENGINESIZE  CYLINDERS  \
0        2014     ACURA          ILX      COMPACT         2.0          4
1        2014     ACURA          ILX      COMPACT         2.4          4
2        2014     ACURA   ILX HYBRID      COMPACT         1.5          4
3        2014     ACURA      MDX 4WD  SUV - SMALL         3.5          6
4        2014     ACURA      RDX AWD  SUV - SMALL         3.5          6

   TRANSMISSION FUELTYPE  FUELCONSUMPTION_CITY  FUELCONSUMPTION_HWY  \
0           AS5        Z                   9.9                  6.7
1            M6        Z                  11.2                  7.7
2           AV7        Z                   6.0                  5.8
3           AS6        Z                  12.7                  9.1
4           AS6        Z                  12.1                  8.7

   FUELCONSUMPTION_COMB  FUELCONSUMPTION_COMB_MPG  CO2EMISSIONS
0                   8.5                        33           196
1                   9.6                        29           221
2                   5.9                        48           136
3                  11.1                        25           255
4                  10.6                        27           244
```
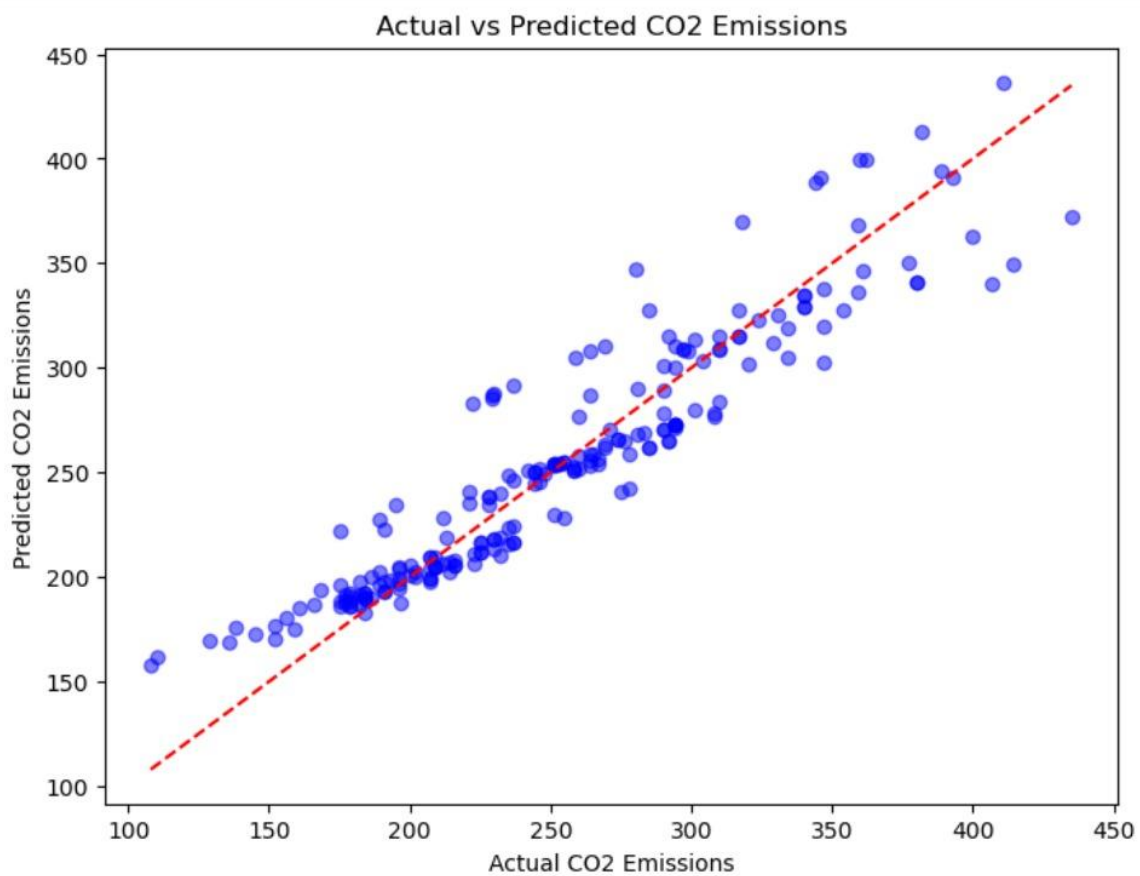
R² Score: 0.8760
Mean Squared Error: 512.8551

Actual vs Predicted CO2 Emissions

```
                    name  year  km_driven    fuel seller_type transmission  \
0           Maruti 800 AC  2007      70000  Petrol  Individual       Manual
1  Maruti Wagon R LXI Minor  2007      50000  Petrol  Individual       Manual
2       Hyundai Verna 1.6 SX  2012     100000  Diesel  Individual       Manual
3      Datsun RediGO T Option  2017      46000  Petrol  Individual       Manual
4       Honda Amaze VX i-DTEC  2014     141000  Diesel  Individual       Manual

          owner  selling_price
0   First Owner          60000
1   First Owner         135000
2   First Owner         600000
3   First Owner         250000
4  Second Owner         450000
name             0
year             0
km_driven        0
fuel             0
seller_type      0
transmission     0
owner            0
selling_price    0
dtype: int64
R² Score: -11689013742.7553
Mean Squared Error: 3567139668228098752512.0000
```


Actual vs Predicted Selling Price
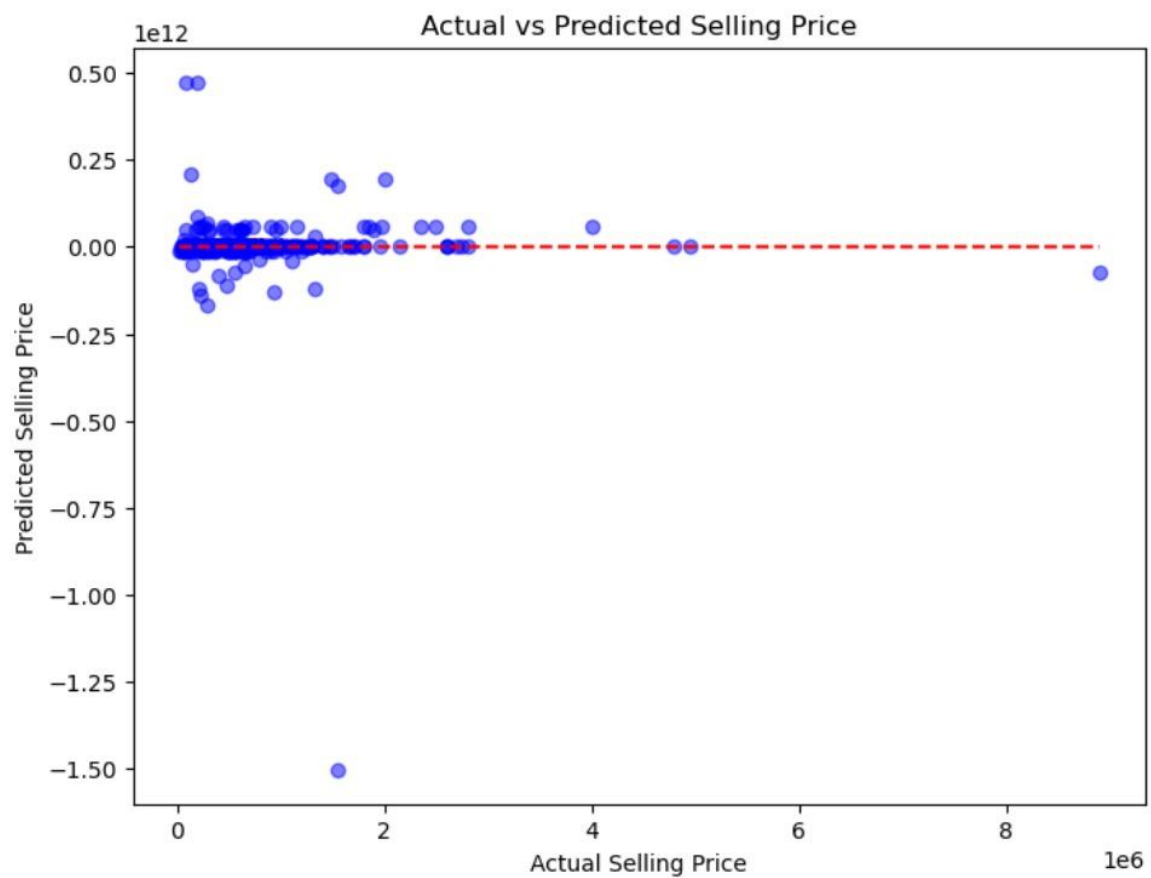
```
     Avg. Area Income  Avg. Area House Age  Avg. Area Number of Rooms  \
0        79545.458574             5.682861                   7.009188
1        79248.642455             6.002900                   6.730821
2        61287.067179             5.865890                   8.512727
3        63345.240046             7.188236                   5.586729
4        59982.197226             5.040555                   7.839388

   Avg. Area Number of Bedrooms  Area Population        Price  \
0                          4.09     23086.800503  1.059034e+06
1                          3.09     40173.072174  1.505891e+06
2                          5.13     36882.159400  1.058988e+06
3                          3.26     34310.242831  1.260617e+06
4                          4.23     26354.109472  6.309435e+05

                                             Address
0  208 Michael Ferry Apt. 674\nLaurabury, NE 3701...
1  188 Johnson Views Suite 079\nLake Kathleen, CA...
2  9127 Elizabeth Stravenue\nDanieltown, WI 06482...
3                          USS Barnett\nFPO AP 44820
4                         USNS Raymond\nFPO AE 09386
Avg. Area Income                float64
Avg. Area House Age             float64
Avg. Area Number of Rooms       float64
Avg. Area Number of Bedrooms    float64
Area Population                 float64
Price                           float64
Address                          object
dtype: object
Lasso Regression - Best Alpha: 0.1
Lasso Regression - R² Score: 0.9180, MSE: 10089007626.9052
Ridge Regression - Best Alpha: 1.0
Ridge Regression - R² Score: 0.9180, MSE: 10089005431.7701
```
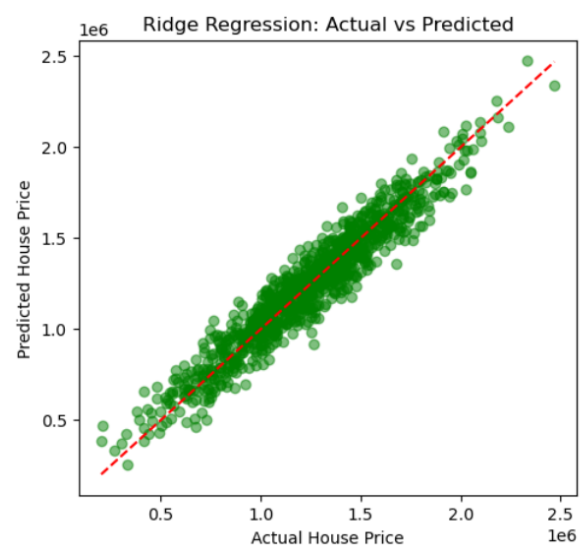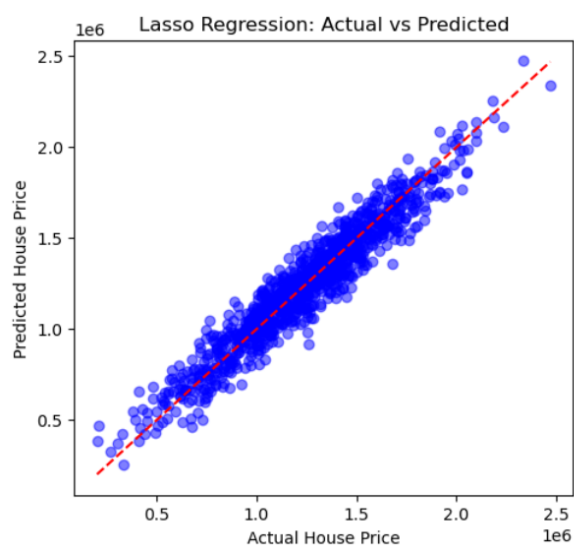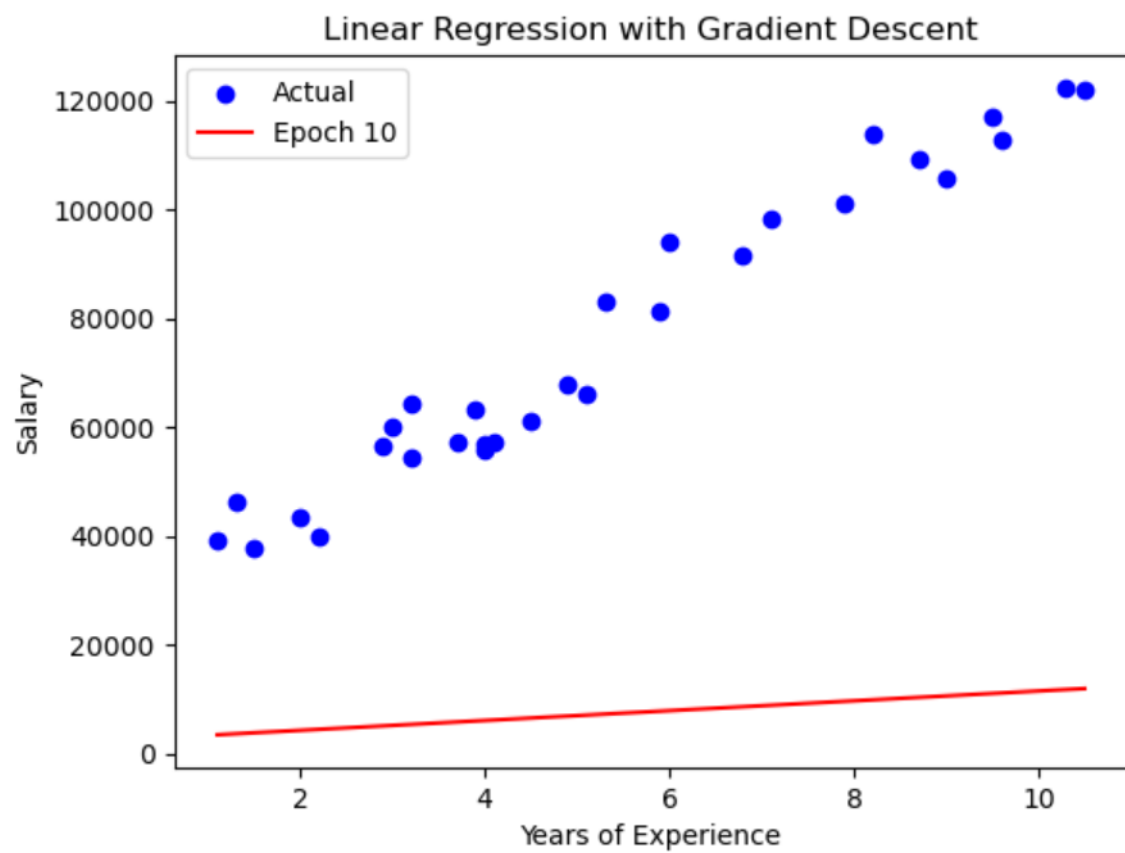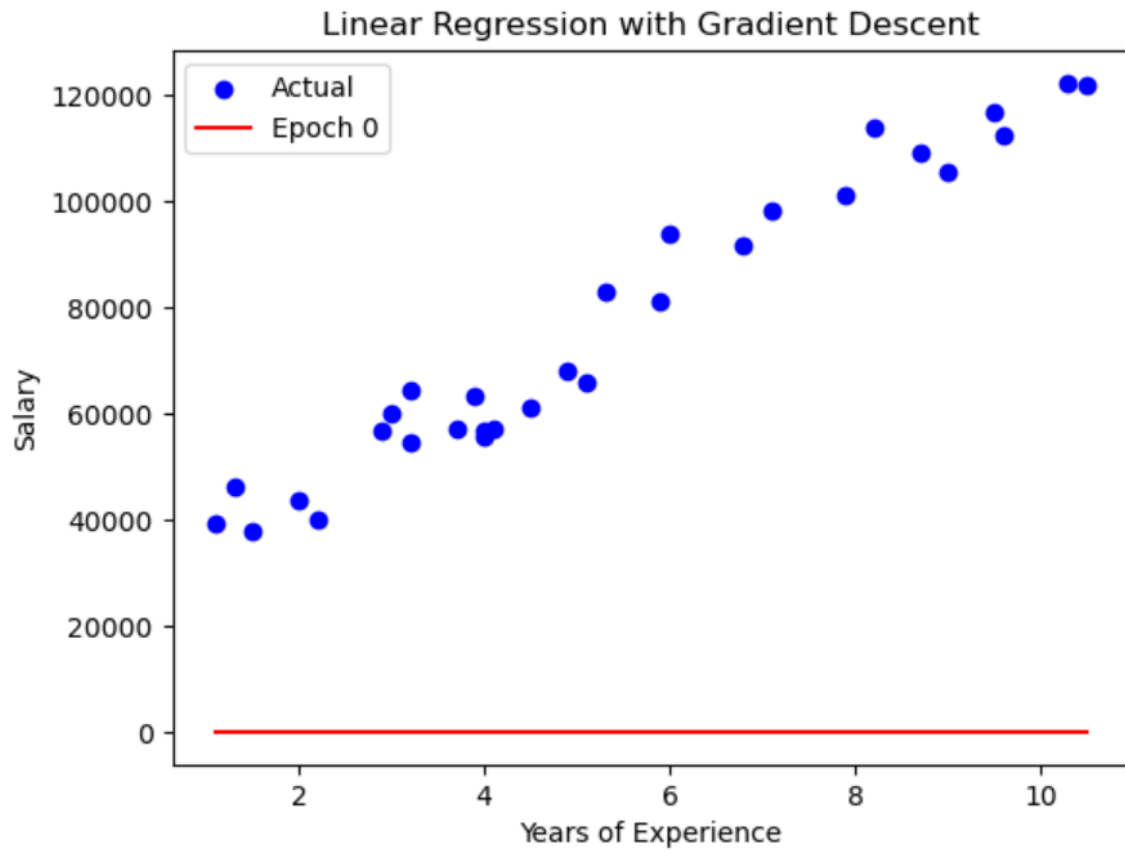

Lasso Regression: Actual vs Predicted / Ridge Regression: Actual vs Predicted

Linear Regression with Gradient Descent

Linear Regression with Gradient Descent

Column Names in Dataset: Index(['Year', 'Value'], dtype='object')

China GDP Growth from 1960 to 2014

Actual vs Predicted GDP
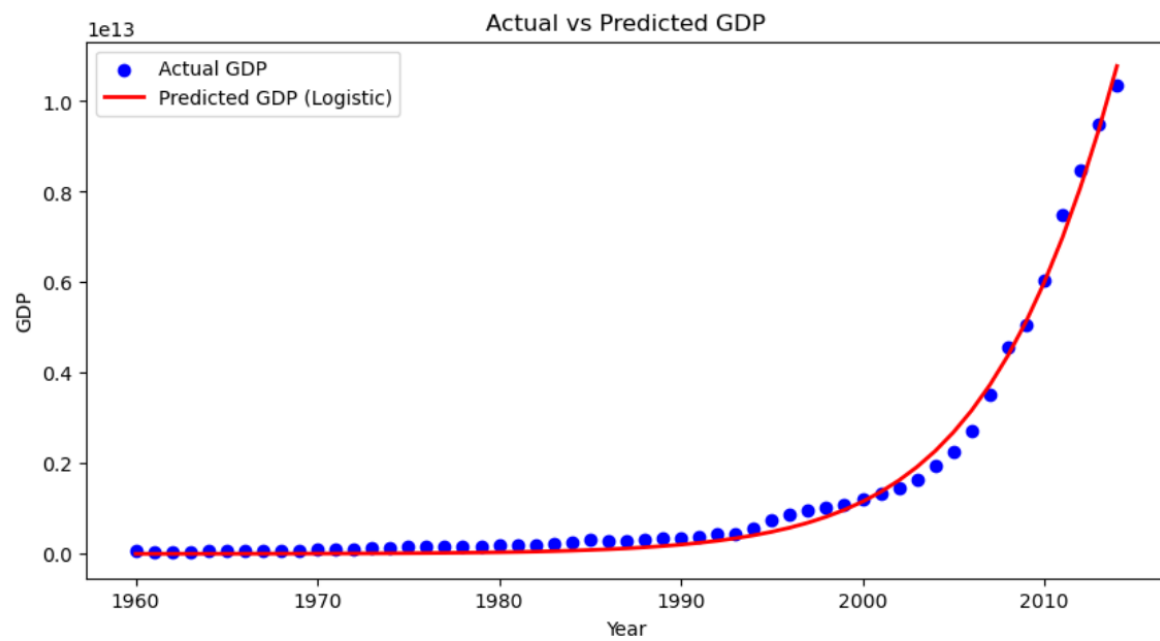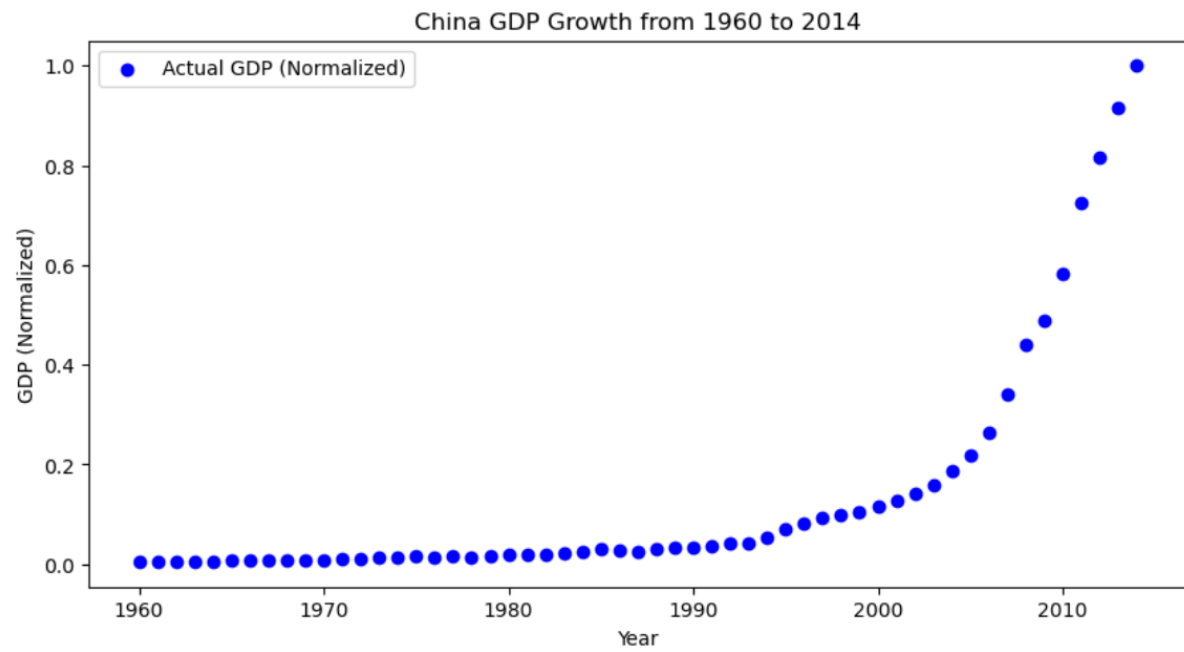
Optimized Parameters: a=0.1752, b=2021.3700, c=4.8272
Final R² Score: 0.9938

```
Dataset Info:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 699 entries, 0 to 698
Data columns (total 11 columns):
 #   Column       Non-Null Count   Dtype
---  ------       --------------   -----
 0   ID           699 non-null     int64
 1   Clump        699 non-null     int64
 2   UnifSize     699 non-null     int64
 3   UnifShape    699 non-null     int64
 4   MargAdh      699 non-null     int64
 5   SingEpiSize  699 non-null     int64
 6   BareNuc      699 non-null     object
 7   BlandChrom   699 non-null     int64
 8   NormNucl     699 non-null     int64
 9   Mit          699 non-null     int64
 10  Class        699 non-null     int64
dtypes: int64(10), object(1)
memory usage: 60.2+ KB
None

Classification Report:
              precision    recall  f1-score   support

           0       0.95      0.99      0.97        95
           1       0.98      0.89      0.93        45

    accuracy                           0.96       140
   macro avg       0.96      0.94      0.95       140
weighted avg       0.96      0.96      0.96       140
```
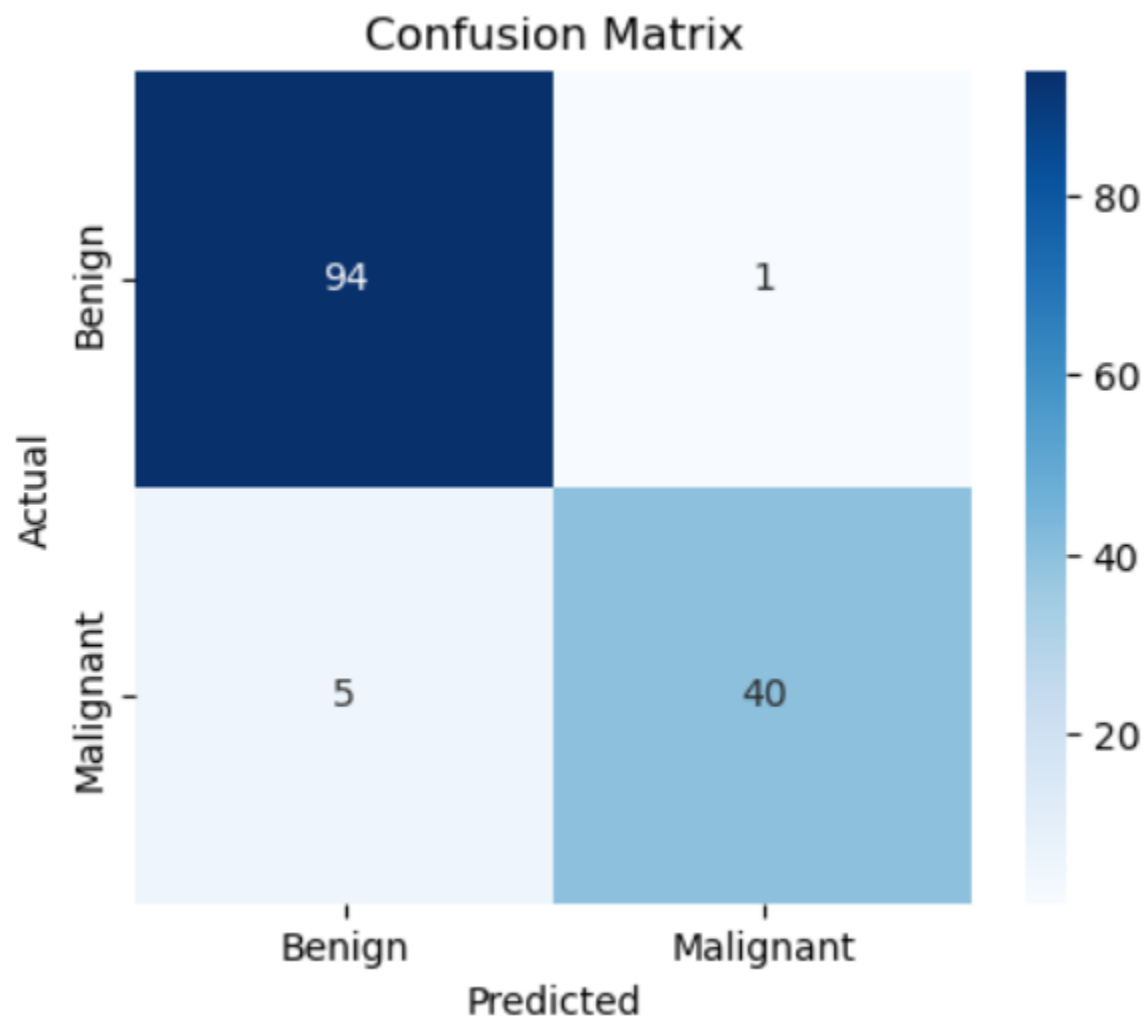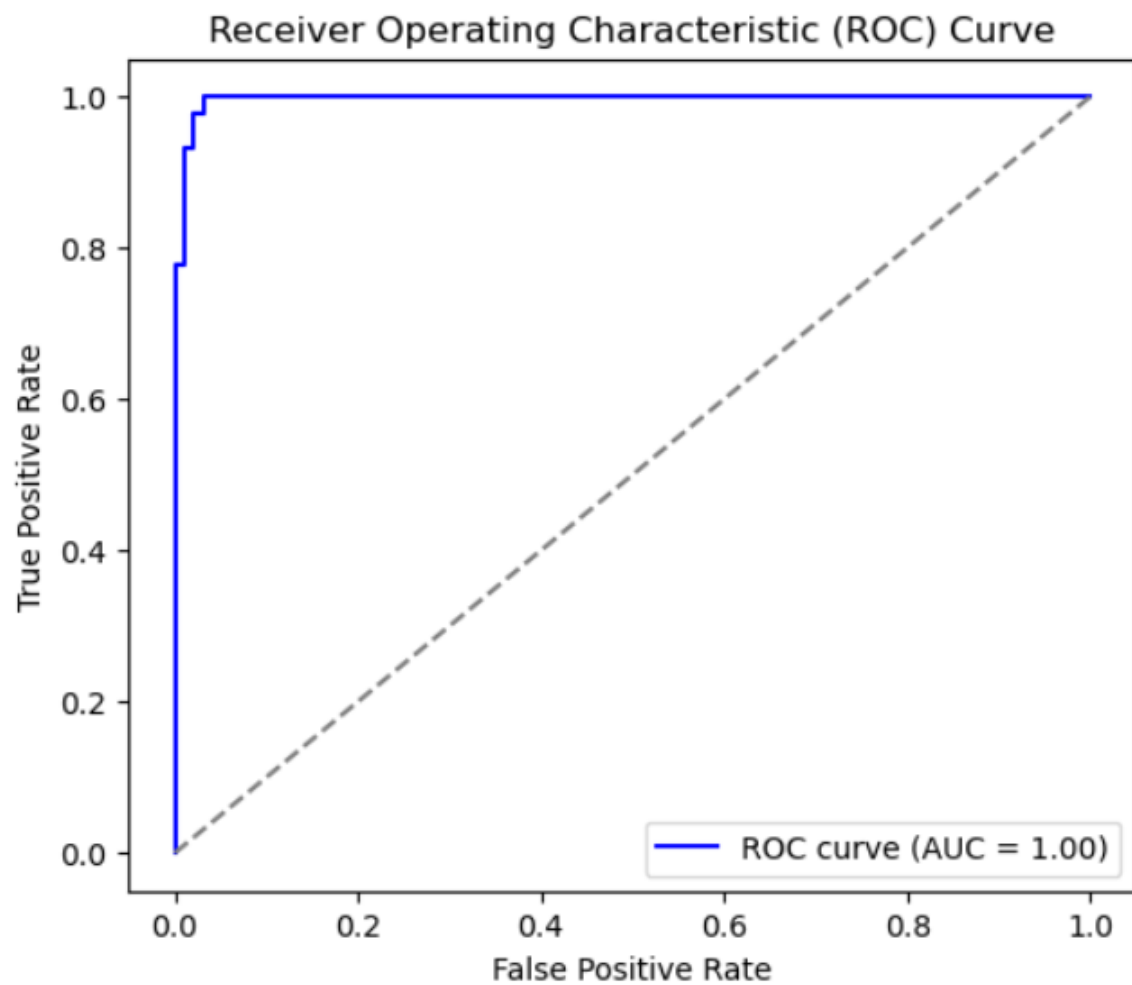
Receiver Operating Characteristic (ROC) Curve

Accuracy: 0.9571
Precision: 0.9756
Recall: 0.8889
F1 Score: 0.9302
AUC Score: 0.9967