Project Report
EE 381

First Name: *Tasos* Last Name: *Lilis*

Student ID: *031295951*

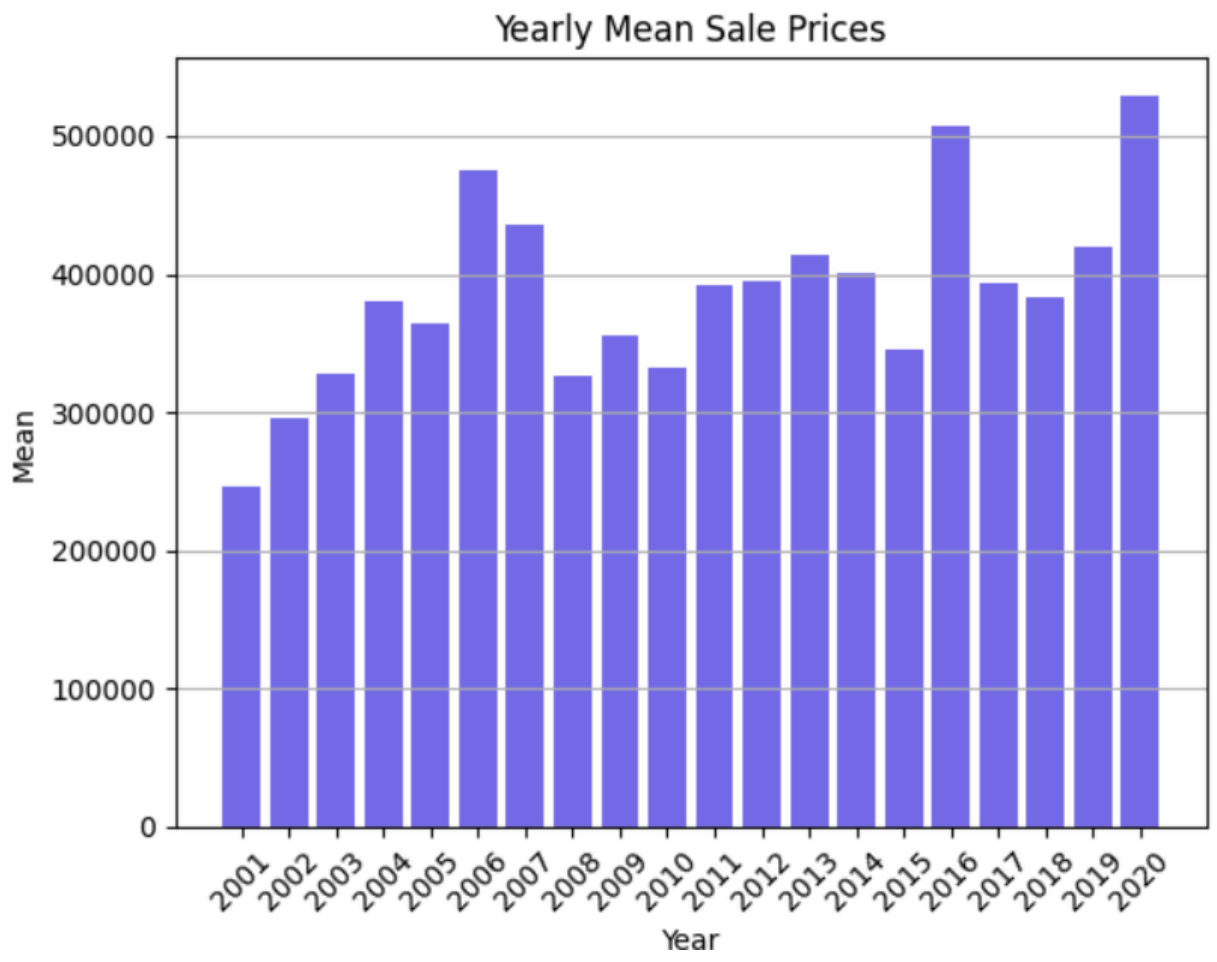
I did this final project on my own and did not share with anyone via discord, emails, verbal, or any other means. If I do, I understand that it is considered as cheating, and there will be an action on my academic dishonesty.

Sign:  Date: *12/05/24*

Mean Price: Fill the table below. (2 point)

Year	Mean Price
2001	246235.035
2005	364030.126
2010	331657.473
2015	345883.764
2020	529887.734

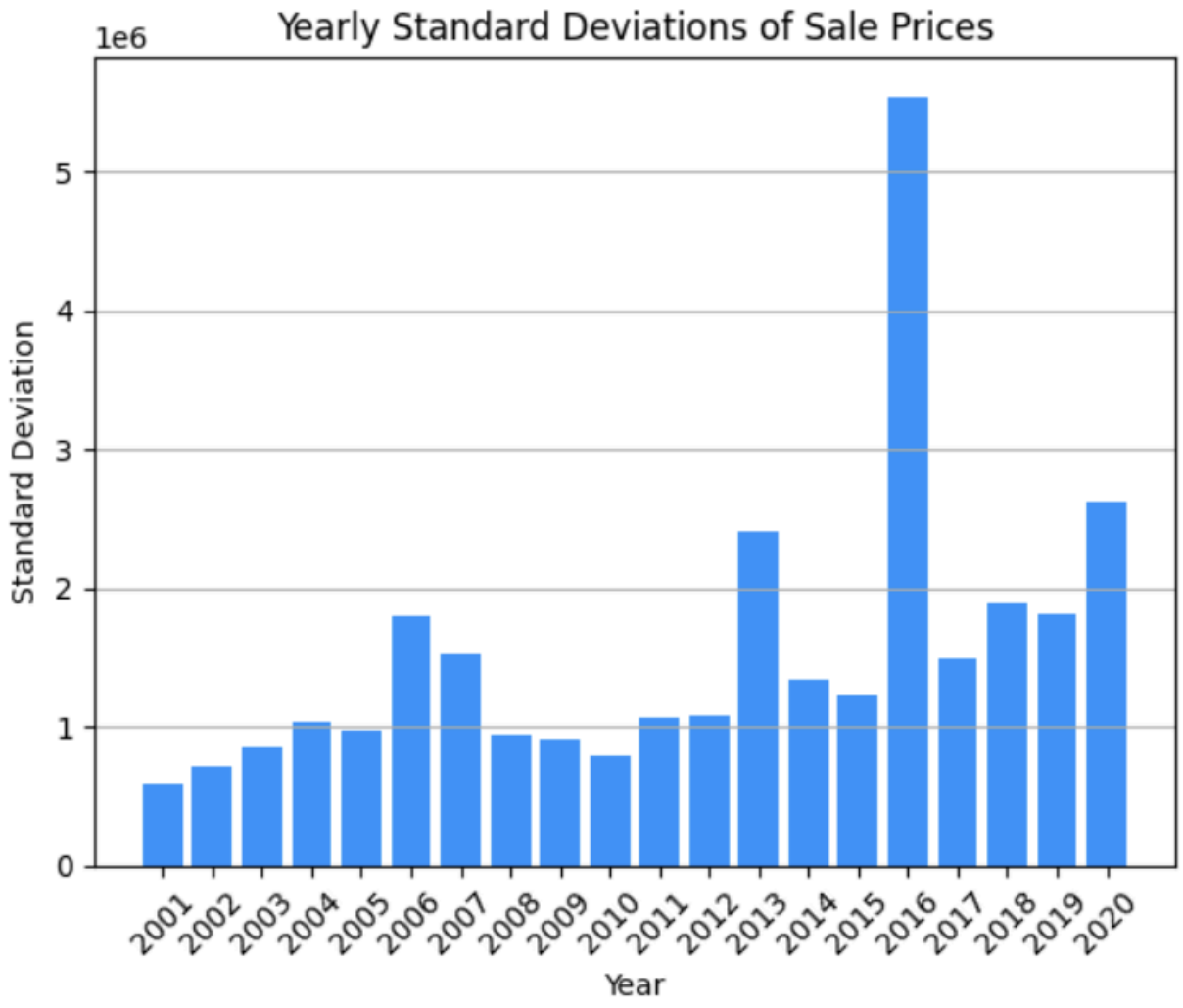
Mean Price: Insert a bar graph below showing yearly mean prices. (2 points)



Standard deviation (STD): Fill the table below. (2 point)

Year	STD
2001	587966.305
2005	978411.06
2010	790809.440
2015	1242088.373
2020	2621806.338

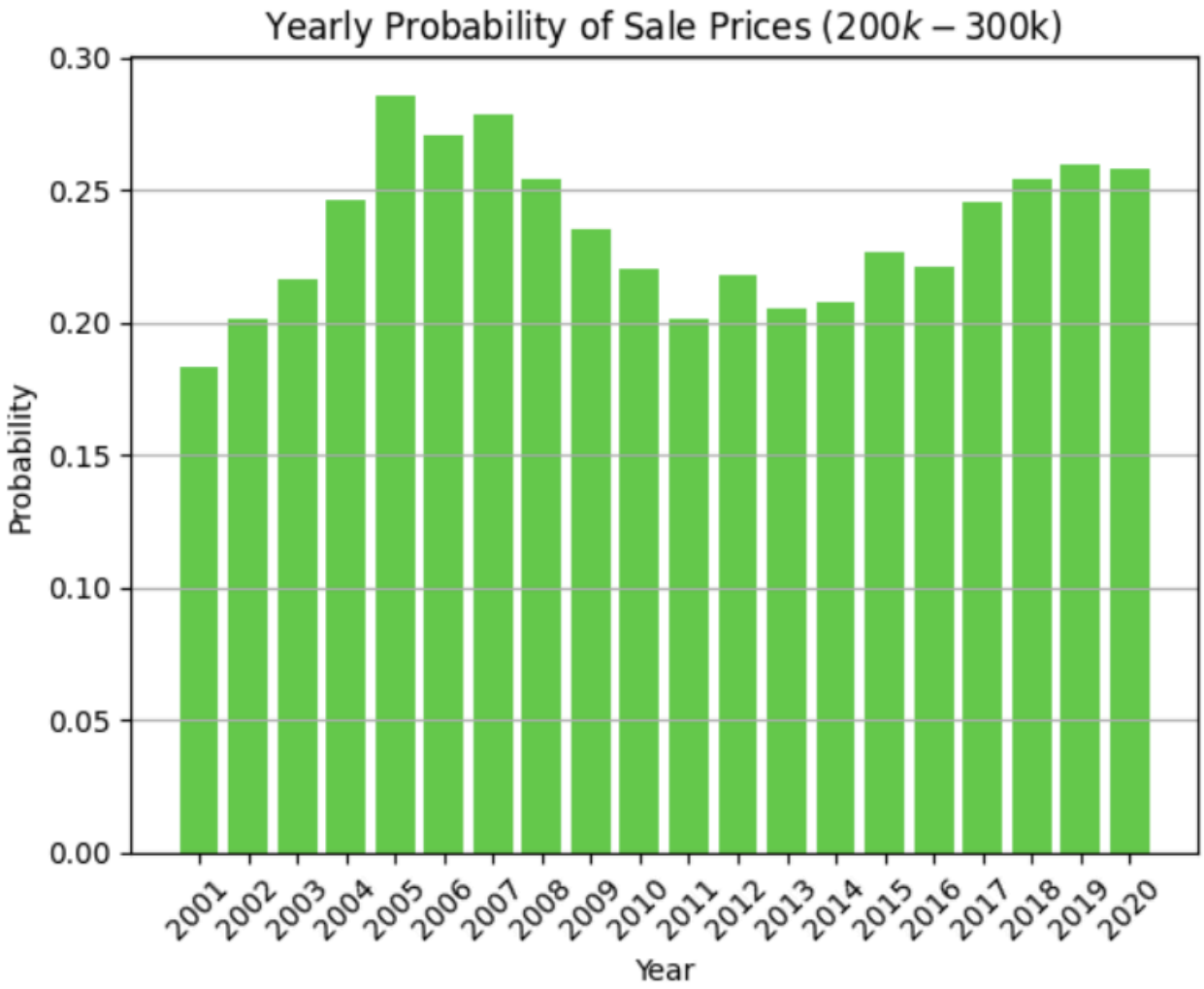
Standard deviation: Insert a bar graph below showing yearly standard deviations. (2 point)



Probability of price ranging from $200,000 to $300,000 inclusive: Fill the table below. (4 points)

Year	**Probability**
2001	0.183
2005	0.286
2010	0.220
2015	0.226
2020	0.258

Insert a bar graph below showing yearly probability of price ranging from $200,000 to $300,000 inclusive. (4 point)



Python Code: Provide your code below. (4 points)

```
import numpy as np
import matplotlib.pyplot as plt

fname = '/Users/tasos/Desktop/School/CSULB/Fall 2024/EE 381/1/Sales_01_20.csv'
data1 = np.loadtxt(fname, delimiter=',', skiprows=1)

years = data1[:, 0].astype(int)
sales = data1[:, 1:].astype(float)

sortFunc = np.argsort(years)
years = years[sortFunc]
sales = sales[sortFunc]

allYears = np.unique(years)

mean = []
standardDeviation = []
probabilities = []

for year in allYears:
   yearPrices = sales[years == year]
   mean.append(np.mean(yearPrices))

   standardDeviation.append(np.std(yearPrices, ddof=1))

   count = np.sum((yearPrices >= 200000) & (yearPrices <= 300000))
   probabilities.append(count / len(yearPrices))


print("Mean Prices by Year:")
for year, mean_price in zip(allYears, mean):
   print(f"{year}: {mean_price}")


print("\nStandard Deviations by Year:")
for year, std in zip(allYears, standardDeviation):
   print(f"{year}: {std}")


print("\nProbabilities by Year:")
for year, prob in zip(allYears, probabilities):
   print(f"{year}: {prob}")


fig, ax = plt.subplots(1, 3, figsize=(18, 5))

ax[0].bar(allYears, mean, color='mediumslateblue')
ax[0].set_title('Yearly Mean Sale Prices')
ax[0].set_xlabel('Year')
ax[0].set_ylabel('Mean')
ax[0].grid(axis='y')
ax[0].set_xticks(allYears)
ax[0].set_xticklabels(allYears, rotation=45)
```

```
ax[1].bar(allYears, standardDeviation, color='dodgerblue')
ax[1].set_title('Yearly Standard Deviations of Sale Prices')
ax[1].set_xlabel('Year')
ax[1].set_ylabel('Standard Deviation')
ax[1].grid(axis='y')
ax[1].set_xticks(allYears)
ax[1].set_xticklabels(allYears, rotation=45)

ax[2].bar(allYears, probabilities, color='limegreen')
ax[2].set_title('Yearly Probability of Sale Prices ($200k-$300k)')
ax[2].set_xlabel('Year')
ax[2].set_ylabel('Probability')
ax[2].grid(axis='y')
ax[2].set_xticks(allYears)
ax[2].set_xticklabels(allYears, rotation=45)

plt.tight_layout()
plt.savefig('Sales.png')
plt.show()
```