Project Report
EE 381

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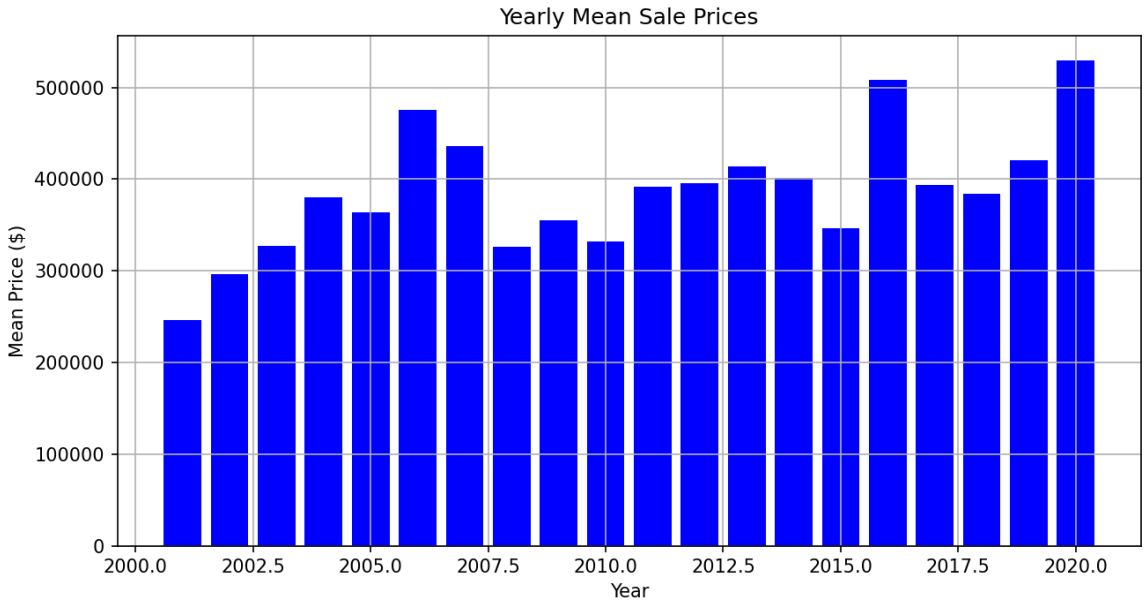
I did this final project own my own and did not share with anyone via discord, emails, verbal, or any other means, if I do, I understand that it is considered as cheating, and there will be an action on my academic dishonesty.

Sign __Bryan Tineo Ccasani_____ Date ___May 6 2024_____

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

Year	**Mean Price**
2001	$246235.04
2005	$364030.13
2010	$331657.47
2015	$345883.76
2020	$529887.73

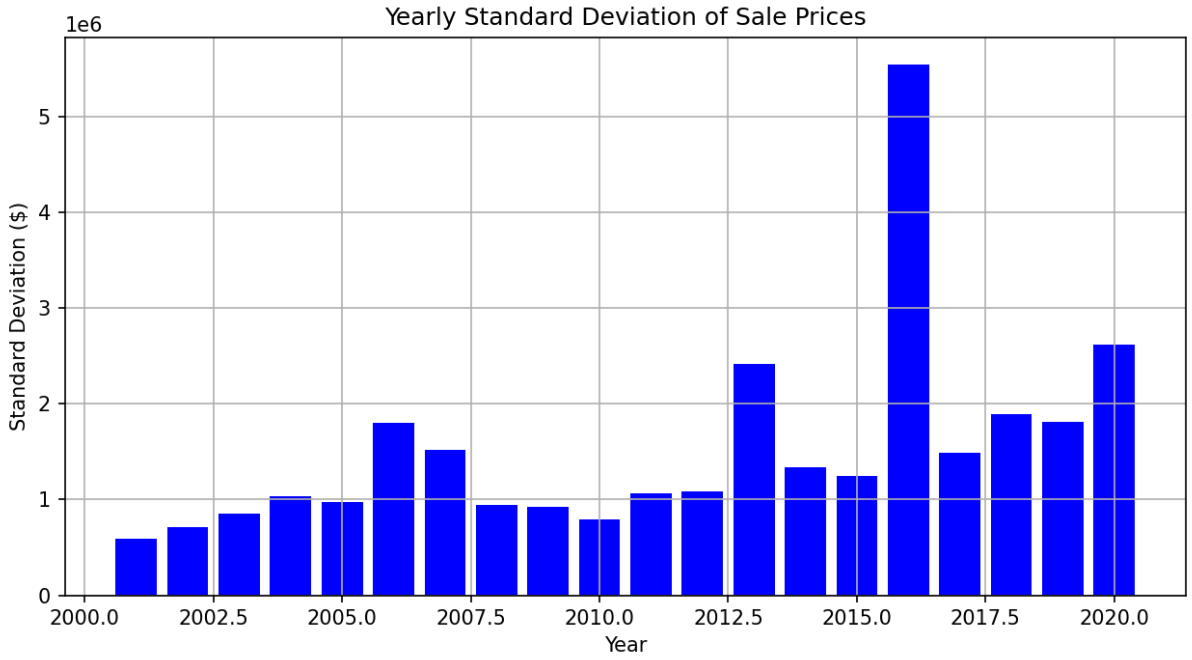
Mean Price: Insert a bar graph below showing yearly mean prices. (2 points)



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

Year	**STD**
2001	$587961.37
2005	$978403.13
2010	$790797.63
2015	$1242075.06
2020	$2621786.65

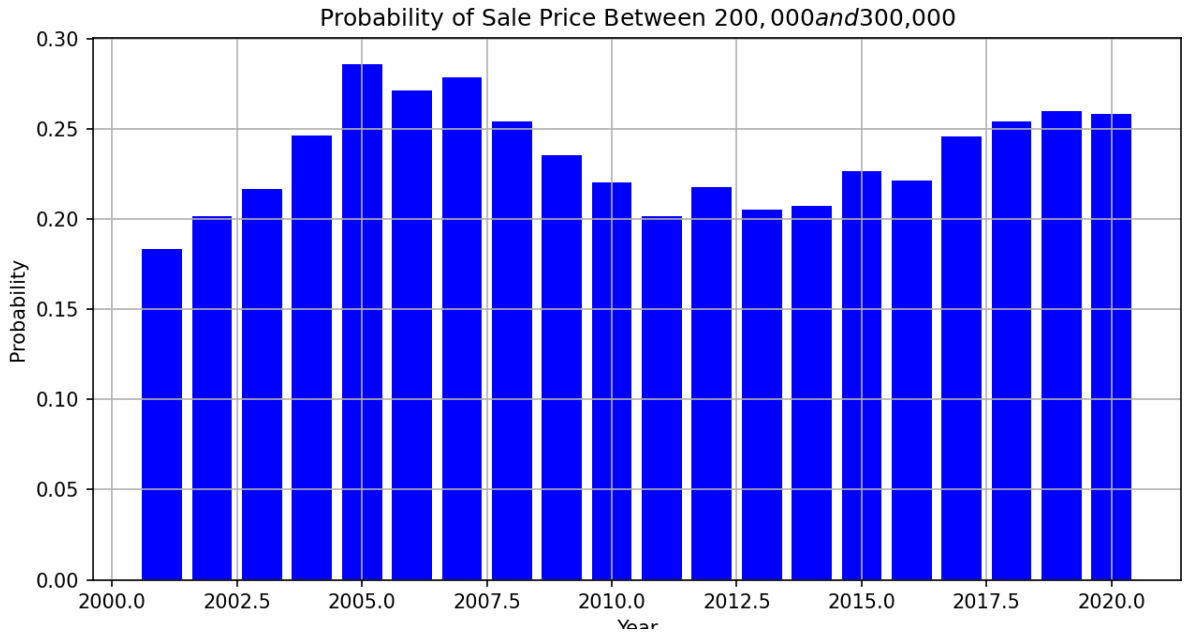
Standard deviation: Insert a bar graph below showing yearly standard deviations. (2 point)



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

Year	**Probability**
2001	18.31%
2005	28.60%
2010	22.02%
2015	22.66%
2020	25.80%

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  # Importing numpy for numerical calculations
import matplotlib.pyplot as plt  # Importing matplotlib for plotting graphs
import csv  # Importing csv to handle CSV file operations
from collections import defaultdict  # Importing defaultdict for easier grouping
of data by year

# Function to load and process data from the CSV file
def load_data(filepath):
    data = defaultdict(list)  # Creating a default dictionary to group sale
amounts by year
    with open(filepath, 'r') as file:  # Opening the CSV file in read mode
        csv_reader = csv.DictReader(file)  # Creating a CSV reader object that
reads the file as a dictionary
        for row in csv_reader:  # Looping through each row in the CSV file
            year = int(row['List Year'])  # Converting the year from string to
integer
            sale_amount = float(row['Sale Amount'])  # Converting the sale amount
from string to float
            data[year].append(sale_amount)  # Appending the sale amount to the
list of its respective year
    return data  # Returning the dictionary containing lists of sale amounts
grouped by year

# Function to calculate yearly mean, standard deviation, and probability of
specified price range
def calculate_statistics(data):
    means = {}  # Dictionary to store mean values for each year
    std_devs = {}  # Dictionary to store standard deviation values for each year
    probabilities = {}  # Dictionary to store probability values for each year
    for year, prices in data.items():  # Looping through each year and its
corresponding prices
        means[year] = np.mean(prices)  # Calculating mean for the current year
        std_devs[year] = np.std(prices)  # Calculating standard deviation for the
current year
        # Counting the number of prices within the specified range for the
current year
        count_in_range = sum(200000 <= price <= 300000 for price in prices)
        probabilities[year] = count_in_range / len(prices)  # Calculating
probability for the current year
    return means, std_devs, probabilities  # Returning the calculated values

# Function to plot data using bar graphs
def plot_data(data, title, ylabel):
```

```
    years = sorted(data.keys())  # Sorting the years to ensure the plot is
ordered
    values = [data[year] for year in years]  # Extracting values in the order of
sorted years
    plt.figure(figsize=(10, 5))  # Setting the figure size for the plot
    plt.bar(years, values, color='blue')  # Creating a bar chart with the years
as x-axis and values as heights
    plt.xlabel('Year')  # Labeling the x-axis as 'Year'
    plt.ylabel(ylabel)  # Labeling the y-axis as specified by the function
parameter
    plt.title(title)  # Setting the title of the plot
    plt.grid(True)  # Enabling the grid for easier visualization
    plt.show()  # Displaying the plot

# Main function to control the flow of the script
def main():
    filepath = 'Sales_01_20.csv'  # Define the file path to the CSV file
    data = load_data(filepath)  # Load and process the data from the CSV file
    means, std_devs, probabilities = calculate_statistics(data)  # Calculate
statistics from the processed data

    # Plotting the results using the plot function
    plot_data(means, 'Yearly Mean Sale Prices', 'Mean Price ($)')
    plot_data(std_devs, 'Yearly Standard Deviation of Sale Prices', 'Standard
Deviation ($)')
    plot_data(probabilities, 'Probability of Sale Price Between $200,000 and
$300,000', 'Probability')

# Checking if the script is run as the main program and not as a module
if __name__ == "__main__":
    main()
```