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# Import libraries
import numpy as np
import matplotlib.pyplot as plt

# Create a function to calculate the depreciation of the vehicle
def depreciation(initialValue, years, numSimul):
    # Generates random rates from a normal distribution with mean of 15% annual depreciation
    # 0.03 standard deviation, and it calculates the value of the car for each
    # simulation scenario and year
    depreRates = np.random.normal(0.15, 0.03, size=(numSimul, years))
    # Takes in tuple argument where array will have numSimul as rows and years as column
    carValues = np.zeros((numSimul, years))
    # Select the first column and setting the value to the initial value
    carValues[:, 0] = initialValue

    # Loops iterate through each year, calculates the car's value for the current by
    # applying the depreciation rates and updates the array carValue
    for year in range(1, years):
        carValues[:, year] = carValues[:, year - 1] * (1 - depreRates[:, year])
        for simul in range(numSimul):
            print(f'Simulation {simul + 1}, Year {year}: ${carValues[simul, year]:.2f}')

    # Returns the array of carValue for each simulation
    return carValues

# Information
# Initial value of the car
initialVal = 32000
# Years to simulate the depreciation of the car
yearsSimulation = 5
# Number of simulations
numSimulation = 5

# Simulate car depreciation
car_values = depreciation(initialVal, yearsSimulation, numSimulation)

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# For visualization
# Plot the results for scenarios
for i in range(5):
    plt.plot(range(yearsSimulation), car_values[i], label=f'Depreciation {i+1}')

# Label table
plt.xlabel('Years')
plt.ylabel('Car Value in $')
plt.title('Car Depreciation')
plt.legend()
plt.grid(True)
plt.show()
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✓ 0.5s

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Simulation 1, Year 1: $27193.04
Simulation 2, Year 1: $26601.71
Simulation 3, Year 1: $28739.58
Simulation 4, Year 1: $26534.04
Simulation 5, Year 1: $28489.98
Simulation 1, Year 2: $21641.46
Simulation 2, Year 2: $22509.44
Simulation 3, Year 2: $23884.79
Simulation 4, Year 2: $23353.74
Simulation 5, Year 2: $23374.63
Simulation 1, Year 3: $19032.65
Simulation 2, Year 3: $18153.79
Simulation 3, Year 3: $19560.52
Simulation 4, Year 3: $19958.42
Simulation 5, Year 3: $19961.81
Simulation 1, Year 4: $15758.39
Simulation 2, Year 4: $14988.01
Simulation 3, Year 4: $16608.02
Simulation 4, Year 4: $16440.74
Simulation 5, Year 4: $16727.01
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