jlh7781_Assignment1

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1 DAAN 862: Assignment 1

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[8]:
```python
# Question 1: List Manipulation and Frequency Analysis

import numpy as np

# Initializing List L1 as per instructions
L1 = []
np.random.seed(56)
for i in np.random.randint(0, 100, 10):
    L1.extend([i] * np.random.randint(0, 100, 1)[0])
np.random.shuffle(L1)

# # 1.1 What are the unique values?
unique_values = sorted(list(set(L1)))
print(f"1.1 Unique Values: {unique_values}")

# # 1.2 How many unique values?
num_unique = len(unique_values)
print(f"1.2 Number of Unique Values: {num_unique}")

# # 1.3 Dictionary with unique items as keys and counts as values
counts_dict = {}
for item in L1:
    counts_dict[item] = counts_dict.get(item, 0) + 1
print(f"1.3 Counts Dictionary: {counts_dict}")

# # 1.4 Which value appears most frequently? (No manual comparison)
most_frequent = max(counts_dict, key=counts_dict.get)
print(f"1.4 Most Frequent Value: {most_frequent}")
```

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1.1 Unique Values: [np.int64(14), np.int64(15), np.int64(22), np.int64(34),
np.int64(55), np.int64(57), np.int64(64), np.int64(85), np.int64(87),
np.int64(90)]
1.2 Number of Unique Values: 10
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1.3 Counts Dictionary: {np.int64(55): 31, np.int64(64): 66, np.int64(22): 33,
np.int64(34): 43, np.int64(87): 80, np.int64(14): 11, np.int64(15): 12,
np.int64(85): 24, np.int64(90): 10, np.int64(57): 89}
1.4 Most Frequent Value: 57
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# Question 2: Loops and Manual Calculations

L2 = [879, 394, 235, 580, 628, 81, 206, 238, 927, 853, 622, 603, 110, 143, 824,
      324, 343, 506, 634, 325, 258, 900, 960, 286, 449, 890, 921, 170, 888, 851]

# 2.1 Use a while loop to calculate the sum of the even numbers
even_sum = 0
index = 0
while index < len(L2):
    if L2[index] % 2 == 0:
        even_sum += L2[index]
    index += 1
print(f"2.1 Sum of even numbers (While Loop): {even_sum}")

# 2.2 Function to calculate mean (No built-in sum or mean)
def calculate_mean(data_list):
    total_sum = 0
    count = 0
    for num in data_list:
        total_sum += num
        count += 1
    return total_sum / count if count > 0 else 0

mean_l2 = calculate_mean(L2)
print(f"2.2 Mean of L2: {mean_l2}")

# 2.3 Calculate the sum for elements in L2 which are larger than 500
sum_large = 0
for num in L2:
    if num > 500:
        sum_large += num
print(f"2.3 Sum of elements > 500: {sum_large}")
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2.1 Sum of even numbers (While Loop): 9418
2.2 Mean of L2: 534.2666666666667
2.3 Sum of elements > 500: 12466
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# Question 3: Implementing the Power Function

# 3.1 Implement pow(x, n) without using x**n
def my_pow(x, n):
    # Handle the exponent being 0
    if n == 0:
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        return 1

    # Handle negative exponents (x^-n = 1 / x^n)
    negative_exponent = False
    if n < 0:
        negative_exponent = True
        n = -n # Work with the absolute value for the loop

    result = 1
    for _ in range(int(n)):
        result *= x

    return 1 / result if negative_exponent else result

# 3.2 Calculate results
res1 = my_pow(2, 10)
res2 = my_pow(3, -3)

print(f"3.2 pow(2, 10) = {res1}")
print(f"3.2 pow(3, -3) = {res2}")
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3.2 pow(2, 10) = 1024
3.2 pow(3, -3) = 0.037037037037037035
```