# Create functions to count all the numbers in a list divisible by a given integer; find the smallest difference  
# between any two numbers in a list; and the product of two size nxn matrices  
  
def count\_multiples(array**,** integer):  
 *"""  
 Determines the number of elements in a given array that are multiples of a given integer value  
 Parameters:  
 array (list): list of numbers to check  
 integer (int): integer value  
 Returns:  
 count (int): number of elements in array that are divisible by integer  
 """* count = **0** for x in array:  
 if x % integer == **0**:  
 count = count + **1** return count  
  
  
def find\_smallest\_gap(array):  
 *"""  
 Determines the smallest difference between any two elements in a list of numbers  
 Parameters:  
 array (list): list of numbers  
 Returns:  
 gap (float): smallest difference between any two elements in array  
 """* gap = **0** for i in range(**0,** len(array) - **1**):  
 for j in range(i + **1,** len(array)):  
 difference = abs(array[i] - array[j])  
 if gap == **0** or gap > difference:  
 gap = difference  
 return gap  
  
  
def matrix\_multiplier(n**,** a**,** b):  
 *"""  
 Calculates the product of two nxn matrices  
 Parameters:  
 n (int): size of the matrices  
 a (list): size nxn matrix of numbers  
 b (list): size nxn matrix of numbers  
 Returns:  
 c (list): size nxn matrix of numbers and product of A and B  
 """* c = [[] \* **0** for \_ in range(n)]  
  
 for row in range(len(a)):  
 for col in range(n):  
 total = **0** for x in range(n):  
 product = a[row][x] \* b[x][col]  
 total = total + product  
 c[row].append(total)  
  
 return c  
  
  
def main():  
 *"""  
 Produces answers for programming assignment #4 questions  
 Returns:  
 prints answers  
 """* # Initialize list for Question 1a  
 q1a = [**20, 21, 25, 28, 33, 34, 35, 36, 41, 42**]  
 # Pass arguments for Question 1a through function  
 q1a\_answer = count\_multiples(q1a**, 7**)  
  
 # Initialize list for Question 1b  
 q1b = [**18, 54, 76, 81, 36, 48, 99**]  
 # Pass arguments for Question 1b through function  
 q1b\_answer = count\_multiples(q1b**, 9**)  
  
 print("Answers to Question 1: ")  
 print(q1a\_answer)  
 print(q1b\_answer)  
 print("-----------------------")  
  
 # Initialize list for Question 2a  
 q2a = [**50, 120, 250, 100, 20, 300, 200**]  
 # Pass arguments for Question 2a through function  
 q2a\_answer = find\_smallest\_gap(q2a)  
  
 # Initialize list for Question 2b  
 q2b = [**12.4, 45.9, 8.1, 79.8,** -**13.64, 5.09**]  
 # Pass arguments for Question 2b through function  
 q2b\_answer = find\_smallest\_gap(q2b)  
  
 print("Answers to Question 2:")  
 print(q2a\_answer)  
 print(q2b\_answer)  
 print("----------------------")  
  
 # Initialize matrices for Question 3a  
 q3a\_matrix\_a = [[**2, 7**]**,** [**3, 5**]]  
 q3a\_matrix\_b = [[**8,** -**4**]**,** [**6, 6**]]  
 # Pass arguments for Question 3a through function  
 q3a\_answer = matrix\_multiplier(**2,** q3a\_matrix\_a**,** q3a\_matrix\_b)  
  
 # Initialize matrices for Question 3b  
 q3b\_matrix\_a = [[**1, 0, 2**]**,** [**3,** -**2, 5**]**,** [**6, 2,** -**3**]]  
 q3b\_matrix\_b = [[**.3, .25, .1**]**,** [**.4, .8, 0**]**,** [-**.5, .75, .6**]]  
 # Pass arguments for Question 3b through function  
 q3b\_answer = matrix\_multiplier(**3,** q3b\_matrix\_a**,** q3b\_matrix\_b)  
  
 print("Answers to Question 3:")  
 print(q3a\_answer)  
 print(q3b\_answer)  
 print("----------------------")  
  
  
main()

Answers to Question 1:

4

5

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Answers to Question 2:

20

3.01

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Answers to Question 3:

[[58, 34], [54, 18]]

[[-0.7, 1.75, 1.3], [-2.4000000000000004, 2.9, 3.3], [4.1, 0.8500000000000001, -1.1999999999999997]]

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