1. Matrix Multiplication

In [1]:
```
import numpy as np

L1, L2 = [], []
r1, c1, r2, c2 = map(int, input("Enter Row and column of first and second matrix: ")

if r2 == c1:
    print("Enter values of 1st matrix")
    L1 = [[int(input()) for j in range (c1)] for i in range(r1)]

    print("\nEnter values of 2nd matrix\n")
    L2 = [[int(input()) for j in range (c2)] for i in range(r2)]

    print("Multiplication of the 2 matrices gives: \n", np.dot(L1, L2))

else:
    print("Multiplication not possible")
```

```
Enter Row and column of first and second matrix: 2 2 2 2
Enter values of 1st matrix
1
2
3
4

Enter values of 2nd matrix

5
6
7
8
Multiplication of the 2 matrices gives:
 [[19 22]
 [43 50]]
```

2. Flatten a nested list

In [16]:
```
def gg(l):
    for i in l:
        if type(i) == list:
            gg(i)
        else:
            L1.append(i)

L = [1, [2, [3, 4], 5], 6]
L1 = []
gg(L)
print(L1)
```

```
[1, 2, 3, 4, 5, 6]
```

3. Inventory Management

In [1]:
```
D = {}

enter = input("Enter the inventory? (Y/N): ").lower()
L = ['y', 'n']
```

```
print()

while (enter == 'y'):
    print('''1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.''')

    n = input("\nChoose a number (1/2/3/4): ")
    print()

    if n == '1':
        name, quantity = input("Enter name of item and quantity: ").split()
        D[name] = int(quantity)
        print("Item was added to inventory")

    elif n == '2':
        name = input("Enter item to be deleted: ")
        if name in D:
            del D[name]
            print("Item deleted")
        else:
            print("Item not found in inventory")

    elif n == '3':
        name, quantity = input("Enter name of item and quantity: ").split()
        D[name] += int(quantity)
        print("Item found and quantity was updated")

    elif n == '4':
        L1 = list(D.keys())
        L1.sort()
        print({i: D[i] for i in L1})

    else:
        print("Invalid Input")

    enter = input("\nStay in the inventory? (Y/N): ").lower()
    while enter not in L:
        print("Invalid Input")
        enter = input("\nStay in the inventory? (Y/N): ").lower()
        if enter == 'y' or enter == 'n':
            break

    print()

print("Aight Good Byee!!")
```

```
Enter the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 1

Enter name of item and quantity: Tushar 8
Item was added to inventory

Stay in the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.
```

```
Choose a number (1/2/3/4): 1

Enter name of item and quantity: Parth 9
Item was added to inventory

Stay in the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 1

Enter name of item and quantity: Kabir 6
Item was added to inventory

Stay in the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 1

Enter name of item and quantity: Dishang 10
Item was added to inventory

Stay in the inventory? (Y/N): Y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 1

Enter name of item and quantity: Sujey 4
Item was added to inventory

Stay in the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 4

{'Dishang': 10, 'Kabir': 6, 'Parth': 9, 'Sujey': 4, 'Tushar': 8}

Stay in the inventory? (Y/N): 3
Invalid Input

Stay in the inventory? (Y/N): Dishang 8
Invalid Input

Stay in the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 3

Enter name of item and quantity: Dishang 8
```

```
Item found and quantity was updated

Stay in the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 4

{'Dishang': 18, 'Kabir': 6, 'Parth': 9, 'Sujey': 4, 'Tushar': 8}

Stay in the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 3

Enter name of item and quantity: Dishang -10
Item found and quantity was updated

Stay in the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 4

{'Dishang': 8, 'Kabir': 6, 'Parth': 9, 'Sujey': 4, 'Tushar': 8}

Stay in the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 2

Enter item to be deleted: Sujev
Item not found in inventory

Stay in the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 2

Enter item to be deleted: Sujey
Item deleted

Stay in the inventory? (Y/N): y

1. Add an item to the inventory.
2. Remove an item from the inventory.
3. Update the quantity of an existing item.
4. Display the current inventory in alphabetical order.

Choose a number (1/2/3/4): 4
```

```
{'Dishang': 8, 'Kabir': 6, 'Parth': 9, 'Tushar': 8}

Stay in the inventory? (Y/N): n

Aight Good Byee!!
```

4. Longest increasing subsequence

In [4]:

```
L = list(map(int, input("Enter array elements: ").split()))
L1 = [L[0]]

temp = L[0]
for i in L:
    if i > temp:
        L1.append(i)
        temp = i
print("Longest increasing subsequence: ", L1)
```

```
Enter array elements: 10 22 9 33 21 50 41 60 80
Longest increasing subsequence:  [10, 22, 33, 50, 60, 80]
```

5. Anagrams

In [8]:

```
# listen silent enlist rat tar art
L = list(map(str, input("Enter wordlist: ").split()))
target = input("Enter target: ")
L1 = []

for i in L:
    if sorted(target) == sorted(i):
        L1.append(i)
print(L1)
```

```
Enter wordlist: listen silent enlist rat tar art
Enter target: silent
['listen', 'silent', 'enlist']
```

6. Knapsack Problem (Bonus)

In [28]:

```
L = [
    {'name':'item1', 'weight':2, 'value':3},
    {'name':'item2', 'weight':3, 'value':4},
    {'name':'item3', 'weight':4, 'value':5},
    {'name':'item4', 'weight':5, 'value':6}
]

out = []
c, n = 5, len(L)
wt, val = [i['weight'] for i in L], [i['value'] for i in L]

def knapSack(c, wt, val, n):
    dp = [0 for i in range(c+1)]
    for i in range(1, n+1):
        for w in range(c, 0, -1):
            if wt[i-1] <= w:
                if dp[w-wt[i-1]]+val[i-1] > max(dp):
                    if L[i-1]['name'] not in out:
                        out.append(L[i-1]['name'])
```

```
                dp[w] = max(dp[w], dp[w-wt[i-1]]+val[i-1])

    return dp[c]

a = knapSack(c, wt, val, n)
ans = ", ".join(out)
print(f"The max capacity is {a}\nValues choosen are: {ans}")
```

```
The max capacity is 7
Values choosen are: item1, item2
```

In [ ]: