```
Enter number of processes: 5
Enter number of resource types: 3
Enter Allocation Matrix (5 x 3):
0 1 0
2 0 0
3 0 2
2 1 1
0 0 2
Enter Max Matrix (5 x 3):
7 5 3
3 2 2
9 0 2
2 2 2
4 3 3
Enter Available Resources (3):
3 3 2
System is in a safe state.
Safe sequence is: P1 P3 P4 P0 P2
```

```
Enter number of processes: 3
Enter arrival time and burst time for each process:
Process 1 Arrival Time: 0
Process 1 Burst Time: 7
Process 2 Arrival Time: 2
Process 2 Burst Time: 4
Process 3 Arrival Time: 4
Process 3 Burst Time: 1
Enter time quantum: 3

Process Arrival Burst   Completion      Turnaround      Waiting
1       0       7       12              12              5
2       2       4       11              9               5
3       4       1       10              6               5

Average Turnaround Time = 9.00
Average Waiting Time = 5.00
```

```
Enter number of processes: 3
Enter arrival time and burst time for each process1:
Process 1 Arrival Time: 0
Process 1 Burst Time: 7
Process 2 Arrival Time: 2
Process 2 Burst Time: 4
Process 3 Arrival Time: 4
Process 3 Burst Time: 1

Process Arrival Burst   Completion      Turnaround      Waiting
1       0       7       7               7               0
2       2       4       12              10              6
3       4       1       8               4               3

Average Turnaround Time = 7.00
Average Waiting Time = 3.00
```

```
Enter number of processes: 3
Enter arrival time and burst time for each process:
Process 1 Arrival Time: 0
Process 1 Burst Time: 5
Process 2 Arrival Time: 1
Process 2 Burst Time: 3
Process 3 Arrival Time: 2
Process 3 Burst Time: 8

Process Arrival Burst   Completion      Turnaround      Waiting
1       0       5       5               5               0
2       1       3       8               7               4
3       2       8       16              14              6

Average Turnaround Time = 8.67
Average Waiting Time = 3.33
```

```
Enter number of processes: 3
Enter arrival time, burst time, and priority (lower number = higher priority) for each process:
Process 1 Arrival Time: 0
Process 1 Burst Time: 5
Process 1 Priority: 2
Process 2 Arrival Time: 1
Process 2 Burst Time: 3
Process 2 Priority: 1
Process 3 Arrival Time: 2
Process 3 Burst Time: 8
Process 3 Priority: 3

Process Arrival Burst   Priority        Completion      Turnaround      Waiting
1       0       5       2               5               5               0
2       1       3       1               8               7               4
3       2       8       3               16              14              6

Average Turnaround Time = 8.67
Average Waiting Time = 3.33
```

```
Enter number of processes: 3
Enter arrival time and burst time for each process:
Process 1 Arrival Time: 0
Process 1 Burst Time: 5
Process 2 Arrival Time: 1
Process 2 Burst Time: 3
Process 3 Arrival Time: 2
Process 3 Burst Time: 8

Process Arrival Burst   Completion      Turnaround      Waiting
1       0       5       5               5               0
2       1       3       8               7               4
3       2       8       16              14              6

Average Turnaround Time = 8.67
Average Waiting Time = 3.33
```

```
Enter number of frames: 3
Enter number of pages: 12
Enter page reference string: 1 2 3 4 1 2 5 1 2 3 4 5
Step  1: 1 - -
Step  2: 1 2 -
Step  3: 1 2 3
Step  4: 1 2 4
Step  5: 1 2 4
Step  6: 1 2 4
Step  7: 1 2 5
Step  8: 1 2 5
Step  9: 1 2 5
Step 10: 3 2 5
Step 11: 4 2 5
Step 12: 4 2 5
Total Page Faults = 7
```

```
Enter number of pages: 12
Enter page reference string: 1 2 3 4 1 2 5 1 2 3 4 5
Enter min and max number of frames: 3
4

Frame Size -> Page Faults
    3     -> 9
    4     -> 10   <<< Belady's Anomaly!
```

```
Enter number of frames: 3
Enter number of pages: 12
Enter page reference string: 1 2 3 4 1 2 5 1 2 3 4 5
Step  1: 1 - -
Step  2: 1 2 -
Step  3: 1 2 3
Step  4: 4 2 3
Step  5: 4 1 3
Step  6: 4 1 2
Step  7: 5 1 2
Step  8: 5 1 2
Step  9: 5 1 2
Step 10: 3 1 2
Step 11: 3 4 2
Step 12: 3 4 5
Total Page Faults = 10
```

```
Enter number of frames: 3
Enter number of pages: 12
Enter page reference string: 1 2 3 4 1 2 5 1 2 3 4 5
Step  1: 1 - -
Step  2: 1 2 -
Step  3: 1 2 3
Step  4: 4 2 3
Step  5: 4 1 3
Step  6: 4 1 2
Step  7: 5 1 2
Step  8: 5 1 2
Step  9: 5 1 2
Step 10: 3 1 2
Step 11: 3 4 2
Step 12: 3 4 5
Total Page Faults = 10
```

```
Enter number of frames: 3
Enter number of pages: 12
Enter page reference string:  1 2 3 4 1 2 5 1 2 3 4 5
Step  1: 1 - -
Step  2: 1 2 -
Step  3: 1 2 3
Step  4: 4 2 3
Step  5: 4 1 3
Step  6: 4 1 2
Step  7: 5 1 2
Step  8: 5 1 2
Step  9: 5 1 2
Step 10: 5 3 2
Step 11: 5 3 4
Step 12: 5 3 4
Total Page Faults = 9
```

```
Enter number of requests: 8
Enter request sequence: 98 183 37 122 14 124 65 67
Enter initial head position: 53
Enter total disk size: 200

Seek Sequence: 53 -> 65 -> 67 -> 98 -> 122 -> 124 -> 183 -> 199 -> 0 -> 14 -> 37
Total Seek Time = 382
Average Seek Time = 47.75
```

```
Enter number of blocks: 5
Enter sizes of blocks: 100 500 200 300 600
Enter number of processes: 4
Enter sizes of processes: 212 417 112 426

Process No.     Process Size    Block No.
1               212             5
2               417             2
3               112             4
4               426             Not Allocated
```

```
Enter number of blocks: 5
Enter sizes of blocks: 100 500 200 300 600
Enter number of processes: 4
Enter sizes of processes: 212 417 112 426

Process No.     Process Size    Block No.
1               212             4
2               417             2
3               112             3
4               426             5
```

```
Enter number of requests: 8
Enter request sequence: 98 183 37 122 14 124 65 67
Enter initial head position: 53
Enter direction (1 = up, 0 = down): 1

Seek sequence: 53 -> 65 -> 67 -> 98 -> 122 -> 124 -> 183 -> 37 -> 14
Total Seek Time = 299
Average Seek Time = 37.38
```

```
Enter number of requests: 8
Enter request sequence: 98 183 37 122 14 124 65 67
Enter initial head position: 53

Seek Sequence: 53 -> 98 -> 183 -> 37 -> 122 -> 14 -> 124 -> 65 -> 67
Total Seek Time = 640
Average Seek Time = 80.00
```

```
Enter number of blocks: 5
Enter sizes of blocks: 100 500 200 300 600
Enter number of processes: 4
Enter sizes of processes: 212 417 112 426

Process No.     Process Size    Block No.
1               212             2
2               417             5
3               112             3
4               426             Not Allocated
```

```
Enter number of requests: 8
Enter request sequence: 98 183 37 122 14 124 65 67
Enter initial head position: 53
Enter total disk size: 200
Enter direction (1=right, 0=left): 1

Seek Sequence: 53 -> 65 -> 67 -> 98 -> 122 -> 124 -> 183 -> 199 -> 37 -> 14
Total Seek Time = 331
Average Seek Time = 41.38
```

```
Enter number of requests: 8
Enter request sequence: 98 183 37 122 14 124 65 67
Enter initial head position: 53

Seek Sequence: 53 -> 65 -> 67 -> 37 -> 14 -> 98 -> 122 -> 124 -> 183
Total Seek Time = 236
Average Seek Time = 29.50
```