

```

6CSEC2@debian:~/Documents/230905252/Lab4$ mpicc -o exe/q1 q1_scan_factorial.c
6CSEC2@debian:~/Documents/230905252/Lab4$ mpicc -o exe/q2 q2_findelement.c
6CSEC2@debian:~/Documents/230905252/Lab4$ mpicc -o exe/q3 q3_scan.c
6CSEC2@debian:~/Documents/230905252/Lab4$ mpicc -o exe/q4 q4_pattern.c
6CSEC2@debian:~/Documents/230905252/Lab4$ mpicc -o exe/q5 q5_matrixop.c
6CSEC2@debian:~/Documents/230905252/Lab4$ mpicc -o exe/q6 q6_pi.c
6CSEC2@debian:~/Documents/230905252/Lab4$ mpirun -n 4 exe/q1
[3] Sum of all factorials: 33

```

// Induce MPI error: MPI_COMM_WORLD -> MPI_COMM_NULL

```

6CSEC2@debian:~/Documents/230905252/Lab4$ mpicc -o exe/q1 q1_scan_factorial.c
6CSEC2@debian:~/Documents/230905252/Lab4$ mpirun -n 4 exe/q1
5      MPI_ERR_COMM: invalid communicator
5      MPI_ERR_COMM: invalid communicator
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-----

```

MPI_ABORT was invoked on rank 1 in communicator MPI_COMM_WORLD
with errorcode 5.

NOTE: invoking MPI_ABORT causes Open MPI to kill all MPI processes.
You may or may not see output from other processes, depending on
exactly when Open MPI kills them.

[debian:520127] 3 more processes have sent help message help-mpi-api.txt / mpi-
abort

[debian:520127] Set MCA parameter "orte_base_help_aggregate" to 0 to see all he
lp / error messages

```

6CSEC2@debian:~/Documents/230905252/Lab4$ mpirun -n 3 exe/q2

```

Enter 3x3 matrix:

1 2 3

4 5 6

5 7 8

Enter element to find: 5

[0] Count of instances of 5: 2

```

6CSEC2@debian:~/Documents/230905252/Lab4$ mpirun -n 4 exe/q3

```

Enter 4x4 matrix:

1 2 3 4

1 2 3 1

1 1 1 1

2 1 2 1

Output 4x4 matrix:

[0] 1 2 3 4

[1] 2 4 6 5

[2] 3 5 7 6

[3] 5 6 9 7

```

6CSEC2@debian:~/Documents/230905252/Lab4$ mpirun -n 4 exe/q4

```

Enter string of length 4: PCAP

[0] Output string: PCCAAAPPPP

```

6CSEC2@debian:~/Documents/230905252/Lab4$ mpirun -n 5 exe/q5

```

Enter 5x5 matrix:

1 2 3 4 5

5 4 3 2 1

10 3 13 14 15

11 22 11 33 44

1 12 5 4 6

Output 5x5 matrix:

0	1	1	1	1
---	---	---	---	---

22	0	2	2	2
----	---	---	---	---

13	13	0	3	3
----	----	---	---	---

33	33	33	0	2
----	----	----	---	---

44	44	44	44	0
----	----	----	----	---

```

6CSEC2@debian:~/Documents/230905252/Lab4$ mpirun -n 1000 --oversubscribe exe/q6

```

[0] Approximation of PI: 3.141592736923126

