Part I: Ground Truth

Verify original full matrix prints correctly as a sparse matrix
1 , 2 , 0 , 0 , 3
4 , 5 , 6 , 0 , 0
0 , 7 , 8 , 0 , 9
0 , 0 , 0 , 10 , 0
11 , 0 , 0 , 0 , 12

Verify norm works correctly using slightly modified test matrix
1 , 2 , 2.5 , 0 , 3
4 , 5 , 6 , 0 , 0
0 , 7 , 8 , 0 , 9
0 , 0 , 0 , 10 , 0
11 , 0 , 0 , 0 , 12
Expected norm is 6.25, Actual norm is 6.25

Result of permute (0, 2):
0 , 7 , 8 , 0 , 9
4 , 5 , 6 , 0 , 0
1 , 2 , 0 , 0 , 3
0 , 0 , 0 , 10 , 0
11 , 0 , 0 , 0 , 12
Norm of sparse and full matrix solutions: 0

Result of permute (0, 4):
11 , 0 , 0 , 0 , 12
4 , 5 , 6 , 0 , 0
1 , 2 , 0 , 0 , 3
0 , 0 , 0 , 10 , 0
0 , 7 , 8 , 0 , 9
Norm of sparse and full matrix solutions: 0

Result of 3.0*row[0] + row[3]
1 , 2 , 0 , 0 , 3
4 , 5 , 6 , 0 , 0
0 , 7 , 8 , 0 , 9
3 , 6 , 0 , 10 , 9
11 , 0 , 0 , 0 , 12
Norm of sparse and full matrix solutions: 0

Result of -4.4*row[4] + row[1]
1 , 2 , 0 , 0 , 3
-44.4 , 5 , 6 , 0 , -52.8
0 , 7 , 8 , 0 , 9
0 , 0 , 0 , 10 , 0
11 , 0 , 0 , 0 , 12
Norm of sparse and full matrix solutions: 0

For x =
5, 4, 3, 2, 1

Result of A*x =
16, 58, 61, 20, 67
Norm of sparse and full matrix solutions: 0

Part 2

Sum using product = 101.594, Sum using values = 101.594
Residue = 8.52651e-13
Time elapsed = 373.664 ms
Peak Memory usage using /proc/self/status -> VmPeak :
VmPeak: 18220 kB