1) A)

1	2	3	4	5	6	7	8	9
4	5	7	6	8	1	9	3	2

1	2	3	4	5	6	7	8	9
5	4	8	7	1	6	2	9	3

Dot product is:

1	2	3	4	5	6	7	8	9
7	1	2	6	9	5	3	8	4

B)

1	2	3	4	5	6	7	8	9
5	7	4	1	8	6	2	3	9

1	2	3	4	5	6	7	8	9
5	7	4	1	8	2	6	3	9

1	2	3	4	5	6	7	8	9
8	6	1	5	3	2	7	4	9

2)

π

1	2	3	4	5
3	4	5	2	1

π^2

1	2	3	4	5
5	2	1	4	3

π^3

1	2	3	4	5
1	4	3	2	5

π^4

1	2	3	4	5
3	2	5	4	1

π^5

1	2	3	4	5
5	4	1	2	3

π^6

1	2	3	4	5
1	2	3	4	5

It took 6 powers of π to obtain the identity matrix.

3)

1	2	3	4	5	6	7	8	9
4	5	7	6	8	1	9	3	2

(1,4,6)(2,5,8,3,7,9,2)
the smallest I for an identity permutation is 21 as LCF(3,7) =21

4)

1	2	3	4	5	6	7	8	9	10
9	4	5	7	6	8	2	10	1	3

(1 9)(2 4 7)(3 5 6 8 10)

LCM=30

For the smallest i=30 for the identity matrix

5)

π

1	2	3	4	5	6	7	8	9	10
4	9	5	8	6	7	2	1	10	3

4	9	5	8	6	7	2	1	10	3
1	2	3	4	5	6	7	8	9	10

π^-1

1	2	3	4	5	6	7	8	9	10
8	7	10	1	3	5	6	4	2	9