Quin Buob HW 14 Ok to post

1) a) $\begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 7 & 1 & 2 & 6 & 9 & 5 & 3 & 8 & 4 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 8 & 6 & 1 & 5 & 3 & 2 & 7 & 4 & 9 \end{bmatrix}$

2) $\pi = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 2 & 1 \end{bmatrix}$, $\pi^2 = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 2 & 1 & 4 & 3 \end{bmatrix}$, $\pi^3 = \pi \times \pi^2 = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 1 & 4 & 3 & 2 & 5 \end{bmatrix}$

$\pi^4 = \pi^2 \times \pi^2 = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 2 & 5 & 4 & 1 \end{bmatrix}$, $\pi^5 = \pi \times \pi^4 = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 4 & 1 & 2 & 3 \end{bmatrix}$,

$\pi^6 = \pi^3 \times \pi^3 = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 1 & 2 & 3 & 4 & 5 \end{bmatrix}$ The smallest i such that $\pi^i = I$ is $i = 6$

3) $\begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 4 & 5 & 7 & 6 & 8 & 1 & 9 & 3 & 2 \end{bmatrix} = \pi$

$\begin{pmatrix} 1 & 4 & 6 \\ 4 & 6 & 1 \end{pmatrix}, \begin{pmatrix} 2 & 5 & 8 & 3 & 7 & 9 \\ 5 & 8 & 3 & 7 & 9 & 2 \end{pmatrix}$ 2 cycles $(146)(258379)$

The smallest i such that $\pi^i = I$ is:

(146) Degree 3

(258379) Degree 6 $i = \text{lcm}(3,6) = 6$ $i = 6$

4) $\pi = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ 9 & 4 & 5 & 7 & 6 & 8 & 2 & 10 & 1 & 3 \end{bmatrix} \Rightarrow \begin{pmatrix} 1 & 9 \\ 9 & 1 \end{pmatrix}, \begin{pmatrix} 2 & 4 & 7 \\ 4 & 7 & 2 \end{pmatrix}, \begin{pmatrix} 3 & 5 & 6 & 8 & 10 \\ 5 & 6 & 8 & 10 & 3 \end{pmatrix}$

(19) Degree 2

(247) Degree 3 $i = \text{lcm}(2,3,5) = 30$

(35681 0) Degree 5

$\pi^{-1} = \begin{bmatrix} 9 & 4 & 5 & 7 & 6 & 8 & 2 & 10 & 1 & 3 \\ 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ 9 & 7 & 10 & 2 & 3 & 5 & 4 & 6 & 1 & 8 \end{bmatrix}$