

Sarah Catonic (okto post) Homework 14

11/7/2021

$$1. a. \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 4 & 5 & 7 & 6 & 8 & 1 & 9 & 3 & 2 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 5 & 4 & 8 & 7 & 1 & 6 & 2 & 9 & 3 \end{pmatrix} \\ = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 7 & 1 & 2 & 6 & 9 & 5 & 3 & 8 & 4 \end{pmatrix}$$

$$b. \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 5 & 7 & 4 & 1 & 8 & 6 & 2 & 3 & 9 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 5 & 7 & 4 & 1 & 8 & 2 & 6 & 3 & 9 \end{pmatrix} \\ = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 8 & 6 & 1 & 5 & 3 & 2 & 7 & 4 & 9 \end{pmatrix}$$

$$2. \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 2 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 2 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 2 & 1 & 4 & 3 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 2 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 1 & 4 & 3 & 2 & 5 \end{pmatrix} \\ \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 2 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 2 & 5 & 4 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 2 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 4 & 1 & 2 & 3 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 2 & 1 \end{pmatrix} \\ = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 1 & 2 & 3 & 4 & 5 \end{pmatrix} \quad \pi^6$$

$$3. \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 1 & 2 & 5 & 4 \end{pmatrix} \quad (132)(45) \quad \text{The smallest } i \text{ is} \\ \text{the lcm}(3,2) = 6$$

$$4. \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ 9 & 4 & 5 & 7 & 6 & 8 & 2 & 10 & 1 & 3 \end{pmatrix} \quad (19)(247)(568103) \\ \text{The smallest } L, i \text{ would be the lcm}(2,3,5) = 30$$

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

1777 - first example of geometric probability - needle problem (allows the "experimental" determination of  $\pi$  by throwing a needle on a plane covered with parallel and equidistant lines and counting the number of times the needle hits a line)

Attempts to apply probability to induction L also appeared in this c.s.