Step-1

A permutation is nothing but a bijective function.

So, we follow that $P^2 = P \circ P$ which is the composition of functions.

Given that P takes (1,2,3,4,5) to (5,4,1,2,3)

This can be interpreted as $$P = \begin{bmatrix} & & & & 1 \\ & & & 1 & \\ 1 & & & & \\ & 1 & & & \\ & & 1 & & \end{bmatrix}$$

That means $1 \to 5, 2 \to 4, 3 \to 1, 4 \to 2, 5 \to 3$

Step-2

When composition with P itself is considered, the resultant can be seen as

$1 \to 5 \to 3, 2 \to 4 \to 2, 3 \to 1 \to 5, 4 \to 2 \to 4, 5 \to 3 \to 1$

Or, this can simply be understood as $1 \to 3, 2 \to 2, 3 \to 5, 4 \to 4, 5 \to 1$

In other words, P^2 takes (1,2,3,4,5) to (3,2,5,4,1).

$$P^2 = \begin{bmatrix} & & 1 & & \\ & 1 & & & \\ & & & & 1 \\ & & & 1 & \\ 1 & & & & \end{bmatrix}$$

Step-3

Similarly, considering P as $1 \to 5, 2 \to 4, 3 \to 1, 4 \to 2, 5 \to 3$, we can reverse them as

$1 \to 3, 2 \to 4, 3 \to 5, 4 \to 2, 5 \to 1$

This is nothing but P^{-1}.

So, P^{-1} takes (1,2,3,4,5) to (3,4,5,2,1).