IN EXAMPLE 11.4, LET $a = 0$ AND $b = \frac{1}{2}$. FIND P, P^2, AND P^3. WHAT WOULD P^n BE? WHAT HAPPENS TO P^n AS n TENDS TO INFINITY? INTERPRET THIS RESULT.

$$P = \begin{bmatrix} 1-a & a \\ b & 1-b \end{bmatrix} \qquad a = 0 \qquad b = \frac{1}{2}$$

$$P = \begin{bmatrix} 1 & 0 \\ 0.5 & 0.5 \end{bmatrix} \longleftarrow \text{ANSWER}$$

$$P^2 = \begin{bmatrix} 1 & 0 \\ 0.5 & 0.5 \end{bmatrix} \cdot \begin{bmatrix} 1 & 0 \\ 0.5 & 0.5 \end{bmatrix} = \begin{bmatrix} (1+0) & (0+0) \\ (0.5+0.25) & (0+0.25) \end{bmatrix}$$

$$P^2 = \begin{bmatrix} 1 & 0 \\ 0.75 & 0.25 \end{bmatrix} \longleftarrow \text{ANSWER}$$

$$P^3 = \begin{bmatrix} 1 & 0 \\ 0.5 & 0.5 \end{bmatrix} \cdot \begin{bmatrix} 1 & 0 \\ 0.75 & 0.25 \end{bmatrix} = \begin{bmatrix} (1+0) & (0+0) \\ (0.5+0.375) & (0+0.125) \end{bmatrix}$$

$$P^3 = \begin{bmatrix} 1 & 0 \\ 0.875 & 0.125 \end{bmatrix}$$

$\nearrow$
ANSWER

AS WE CAN SEE, AS P^n TENDS TO INFINITY,

$$P^n = \begin{bmatrix} 1 & 0 \\ 1-(0.5)^n & (0.5)^n \end{bmatrix} \longrightarrow \lim_{n \to \infty} P^n = \begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$$

$\nearrow$
ANSWER