3.2.1

$$p = \begin{pmatrix} \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} \end{pmatrix}$$

$$\mathbf{P} = \begin{pmatrix} 0,4 & 0,3 & 0,2 & 0,1 \\ 0,1 & 0,4 & 0,3 & 0,2 \\ 0,3 & 0,2 & 0,1 & 0,4 \\ 0,2 & 0,1 & 0,4 & 0,3 \end{pmatrix}$$

Proof by induction. Obviously the result holds for $n = 0$. Observe that $p\mathbf{P} = p$. We assume $p\mathbf{P}^n = p$ and then we consider the case $n \to n + 1$

$$p\mathbf{P}^{n+1} = p\mathbf{P}\mathbf{P}^n = p\mathbf{P}^n = p$$

This can be explained by the columns summing to 1 and the initial distribution being equally distributed.