

$$\begin{pmatrix} 0.4 \\ 0.6 \end{pmatrix} \xrightarrow[0.5]{0.2} \begin{pmatrix} 0.32 + 0.3 \\ 0.08 + 0.3 \end{pmatrix}$$

$$\begin{pmatrix} 0.62 \\ 0.38 \end{pmatrix}$$

11.  $\begin{pmatrix} 1 \\ 0 \end{pmatrix} \oplus \begin{pmatrix} 1 \\ 0 \end{pmatrix}$



$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix} \oplus \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$= \begin{pmatrix} \frac{1}{2} \\ \frac{1}{2} \end{pmatrix} \oplus \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

$$= \begin{pmatrix} 0 \\ \frac{1}{2} \\ 0 \\ \frac{1}{2} \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{pmatrix} \begin{pmatrix} 0 \\ \frac{1}{2} \\ 0 \\ \frac{1}{2} \end{pmatrix}$$



$$= \begin{pmatrix} 0 \\ \frac{1}{2} \\ \frac{1}{2} \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \text{ is reversible?}$$

$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$  is not a probabilistic operator