

$$\begin{aligned}
\text{cov}[y] &= E[(y - E(y))(y - E(y))^T] \\
&= E[(Ax - AE[x])(Ax - AE(x))^T] \\
&= E[A(x - E[x])(x - E[x])^T A^T] \\
&= AE[(x - E[x])(x - E[x])^T] A^T \\
&= A\text{cov}[x]A^T
\end{aligned}$$