

cholesky decomposition:

→ Symmetric matrix to lower triag matrix

$$\begin{bmatrix} 36 & 30 & 18 \\ 30 & 41 & 23 \\ 18 & 23 & 14 \end{bmatrix} = \begin{bmatrix} 6 & 0 & 0 \\ 5 & 4 & 0 \\ 3 & 2 & 1 \end{bmatrix} * \begin{bmatrix} 6 & 5 & 3 \\ 0 & 4 & 2 \\ 0 & 0 & 1 \end{bmatrix}$$

Simplifies solving linear system of equations

suppose

$$\begin{bmatrix} 36 & 30 & 18 \\ 30 & 41 & 23 \\ 18 & 23 & 14 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 288 \\ 296 \\ 173 \end{bmatrix}$$

$$\Rightarrow L^*C = b \Rightarrow \begin{bmatrix} 6 & 0 & 0 \\ 5 & 4 & 0 \\ 3 & 2 & 1 \end{bmatrix} * \begin{bmatrix} 48 \\ 14 \\ 1 \end{bmatrix} = \begin{bmatrix} 288 \\ 296 \\ 173 \end{bmatrix}$$

$$L^T * X = C \Rightarrow \begin{bmatrix} 6 & 5 & 3 \\ 0 & 4 & 2 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 5 \\ 3 \\ 1 \end{bmatrix} = \begin{bmatrix} 48 \\ 14 \\ 1 \end{bmatrix}$$

Monte-carlo simulations:

→ want to generate many correlation normal Random variables (multi-variate Normal PDF)

→ We can generate uncorrelated random variables and generate correlated RV from it