B.24 We would like to find a linear transform of the vector $\varepsilon = [\varepsilon_1 \ \varepsilon_2 \ \varepsilon_3]$ such that $A\varepsilon$ has variance-covariance matrix Σ. By construction the variance-covariance matrix of ε is an identity matrix. By the portfolio theorem for covariances

$$\Sigma_{A\varepsilon} = A\Sigma_\varepsilon A^* = AA^*.$$

Hence we need to find A such that $AA^* = \Sigma$. But we already have such a matrix in the form of the lower triangular matrix of the Cholesky decomposition, becasue $\sigma\sigma^* = \Sigma$! So it is enough to take the matrix of the generated values $\varepsilon_{\text{data}}$ and multiply it from the right by σ^*. The resulting series will have population variance-covariance matrix equal to Σ. Finally we add the mean to obtain the return series IF (this works because adding a constant does not change the variances or covariances). Try this, starting with EXCEL spreadsheet *ExeB_24.xls*. For a solution see the EXCEL spreadsheet *ExeB_24Sol.xls*.