1. Givens rotations

A Givens rotation is represented by a matrix of the form

$$G(i,j,\theta) = \begin{bmatrix} 1 & \dots & 0 & \dots & 0 & \dots & 0 \\ \vdots & \ddots & \vdots & & \vdots & & \vdots \\ 0 & \dots & c & \dots & -s & \dots & 0 \\ \vdots & & \vdots & \ddots & \vdots & & \vdots \\ 0 & \dots & s & \dots & c & \dots & 0 \\ \vdots & & \vdots & & \vdots & \ddots & \vdots \\ 0 & \dots & 0 & \dots & 0 & \dots & 1 \end{bmatrix}, \tag{1.1}$$

which is, when $i > j$,

$$G_{kk} = 1 \text{ for } k \neq i,j, \quad G_{ii} = G_{jj} = \cos(\theta), \quad G_{ji} = -G_{ij} = -\sin(\theta). \tag{1.2}$$

(See https://en.wikipedia.org/wiki/Givens_rotation.)