

$$\Pi_2 = \mathbf{U}_2 \mathbf{U}_2^t = \begin{pmatrix} \frac{2}{3} & \frac{1}{3} & \frac{-1}{3} \\ \frac{1}{3} & \frac{2}{3} & \frac{1}{3} \\ \frac{-1}{3} & \frac{1}{3} & \frac{2}{3} \end{pmatrix}$$