Let \( \vec{v}_1 = \begin{bmatrix} \sqrt{2}/6 \\ 2\sqrt{2}/3 \\ \sqrt{2}/6 \end{bmatrix} \), \( \vec{v}_2 = \begin{bmatrix} 2/3 \\ -1/3 \\ 2/3 \end{bmatrix} \), and \( \vec{v}_3 = \begin{bmatrix} \sqrt{2}/2 \\ 0 \\ -\sqrt{2}/2 \end{bmatrix} \). Let \( \mathcal{B} \) be the basis of \( \mathbb{R}^3 \) consisting of \( \vec{v}_1, \vec{v}_2, \vec{v}_3 \). As you saw on the midterm, \( \mathcal{B} \) is an orthonormal basis.

For each of the following linear transformations \( T_i \), write their matrix with respect to \( \mathcal{B} \) (i.e. \( [T_i]_{\mathcal{B}} \)), and a product of matrices and their inverses that yields their standard matrix.

(a) \( T_1 \): projection onto the line spanned by \( \vec{v}_2 \).
(b) \( T_2 \): reflection across the plane spanned by \( \vec{v}_2 \) and \( \vec{v}_3 \).
(c) \( T_3 \): counterclockwise rotation by \( \pi/4 \) radians around \( \vec{v}_1 \).
   (Here, “counterclockwise” means as viewed from \( \vec{v}_1 \).)
(d) \( T_4 \): counterclockwise rotation by \( 2\pi/3 \) radians around \( \vec{v}_2 \).

Also do the following problems:
6.3: 22, 24, 25. (I didn’t spend a lot of time talking about Cramer’s rule, so read about it in the book.)
7.1: 2, 8, 10, 15, 16

Happy Thanksgiving!