Lecture 11 Problems

Problem 1:

There are five permutation matrices out:

$$\underline{A}\begin{bmatrix}0&1&0\\1&0&0\\0&0&1\end{bmatrix}, \quad \underline{B}\begin{bmatrix}0&0&1\\0&1&0\\1&0&0\end{bmatrix}, \quad \underline{C}\begin{bmatrix}1&0&0\\0&0&1\\0&1&0\end{bmatrix}, \quad \underline{D}\begin{bmatrix}0&1&0\\0&0&1\\1&0&0\end{bmatrix}, \quad \underline{E}\begin{bmatrix}0&0&1\\1&0&0\\0&1&0\end{bmatrix}$$

Then,

$$I = C - D + A + B - E$$

Problem 2

(a): X that satisfy $AX = 0$ must be of the form

$$X = \begin{bmatrix} c_1 & c_2 & c_3 \\ c_1 & c_2 & c_3 \\ c_1 & c_2 & c_3 \end{bmatrix}$$

(b): For a matrix to be of the form AX, we would need it to be of the form

$$\begin{bmatrix} c_1 & c_2 & c_3 \\ c_4 & c_5 & c_6 \\ -(c_1+c_4) & -(c_2+c_5) & -(c_3+c_6) \end{bmatrix}$$

(c): Nullspace has dimension 3, Column spaces has dimension 6, and $3+6=9$.