Lecture 15 Problems

Problem 1

P is 4x4 and equals

$$\begin{bmatrix} 1 & & & \\ & 1 & & \\ & & 1 & \\ & & & 0 \end{bmatrix};$$

for $b = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$,

$$Pb = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 0 \end{bmatrix}$$

Problem 2

For $P^2 = P$, we have by foil:

$$(I - P)^2 = I^2 + P^2 - 2IP$$
$$= I + P - 2P$$
$$= I - P.$$

Since

$$I - P = \begin{bmatrix} 0 & & \\ & 0 & \\ & & 0 \\ & & & 1 \end{bmatrix},$$ Then this projects onto the left nullspace of A.