Math 54, Spring 2009, Sections 109 and 112
(Mini) Worksheet 6 (Lay 6.5)

Let $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$, $\vec{b} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$, and $W = \text{Span}\left\{ \begin{bmatrix} 1 \\ 2 \end{bmatrix} \right\}$.

(i) Find $\text{Proj}_W \vec{b}$.

(ii) Why is $A\vec{x} = \text{Proj}_W \vec{b}$ consistent?

(iii) Solve $A\vec{x} = \text{Proj}_W \vec{b}$.

(iv) If x_0 is a solution from (iii), why is $\left\| A\vec{x}_0 - \vec{b} \right\| \leq \left\| A\vec{x} - \vec{b} \right\|$ for any $x \in \mathbb{R}^2$?