U =span$((1,1,0,0),(1,1,1,2))$. We want to find a vector in U such that the distance to $(1,2,3,4)$ is minimal. We can find this just by calculating $P_U(1,2,3,4)$. To do that, we need to find an orthonormal basis for U. Since $(1,1,0,0),(1,1,1,2)$ are lin. indep. they form a basis for U. So, just apply Gram-Schmidt to those vectors to get an orthonormal basis for U.

$$
\begin{aligned}
e_1 &= \frac{(1,1,0,0)}{||(1,1,0,0)||} && = \frac{1}{\sqrt{2}}(1,1,0,0) \\
e_2 &= \frac{(1,1,1,2) - \langle (1,1,1,2), e_1 \rangle e_1}{||1,1,1,2) - \langle (1,1,1,2), e_1 \rangle e_1||} && = \frac{1}{\sqrt{5}}(0,0,1,2)
\end{aligned}
$$

Then, to find $P_U(1,2,3,4)$, just compute:

$$\langle (1,2,3,4)e_1 \rangle e_1 + \langle (1,2,3,4)e_2 \rangle e_2 = \frac{3}{2}(1,1,0,0) + \frac{11}{5}(0,0,1,2)$$

So, the vector $u \in U$ that minimizes the distance to $(1,2,3,4)$ is $u = \frac{3}{2}(1,1,0,0) + \frac{11}{5}(0,0,1,2)$.