To minimize $J_1$ we take $\frac{dJ_1}{da_k} = 0$ and we obtain:

$$a_k = \vec{e}^T(\vec{x_k} - \vec{m}) \tag{8}$$

which is the least squares solution by projecting $\vec{x_k}$ into a line passing through $\vec{m}$ in the direction of $\vec{e}$.