We define corresponding subsets by $Y_1$ and $Y_2$. If $||\vec{w}|| = 1$ then each $y_i$ is a projection of $x_i$ onto a line in the direction of $\vec{w}$.

$$\vec{m_i} = \frac{1}{n_i} \sum_{\vec{x} \in D_i} \vec{x} \tag{20}$$

$$\tilde{m_i} = \frac{1}{n_i} \sum_{y \in Y_i} y \tag{21}$$

$$= \frac{1}{n_i} \frac{\vec{x} \in D_i}{\vec{w}^T \vec{x}} \tag{22}$$

$$= \vec{w}^T \vec{m_i} \Rightarrow |\tilde{m}_1 - \tilde{m}_2| = |\vec{w}^T (\vec{m}_1 - \vec{m}_2)| \tag{23}$$

Equation 23 is the projected mean, which is a projection on $\vec{m_i}$ [1, 118].