

Complete the square formula:

Show that the following formula is true.

$$v(\theta - a)^2 + w(\theta - b)^2 = (v + w)(\theta - \hat{\theta})^2 + \left(\frac{vw}{v + w}\right)(a - b)^2$$

Where  $\theta$  is the variable and  $v, w, a, b$  are fixed and known constants. And where

$$\hat{\theta} = \left(\frac{v}{v + w}\right)a + \left(\frac{w}{v + w}\right)b \text{ is the posterior mean.}$$