first and and second principal components of  $\vec{v_1}$  = (3.38, 2.07)

$$v_1 = (3.38, 2.07)$$
 $proj_2 \vec{v_1} = (-0.10, 0.18)$ 
 $proj_1 \vec{v_1} = (0, 0) \quad (3.47, 1.89)$ 

$$\|\vec{v_1}\|^2 = \|proj_1\vec{v_1}\|^2 + \|proj_2\vec{v_1}\|^2 = 3.47^2 + 1.89^2 + -0.10^2 + 0.18^2$$