Final Quiz

$$proj_v x = \frac{x \cdot v}{v \cdot v} v$$

$$Var(X) = E[(X - \mu)^2] = 1/n \sum_{i=1}^{n} (x_i - \mu)^2$$

$$\begin{aligned} Cov(X, Y) &= E[(XY)] - E[X]E[Y] \\ &= 1/n \sum_{i=1}^{n} (x_i - E[X])(y_i - E[Y]) \end{aligned}$$

$$Q = 1/n \sum_{i=1}^{n} (u_i - Q)(u_i - Q)^T$$

Question

Compute the projection of the vector v=⟨3,1⟩ onto w=⟨1,2⟩.

$$v = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$$

$$w = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$$

$$\text{proj}_w \mathbf{v} = \frac{\mathbf{v} \cdot \mathbf{w}}{\mathbf{w} \cdot \mathbf{w}} \mathbf{w}$$

$$v \cdot w = 3 \cdot 1 + 1 \cdot 2 = 3 + 2 = 5$$

$$w \cdot w = 1 \cdot 1 + 2 \cdot 2 = 1 + 4 = 5$$

$$\text{proj}_\mathbf{w} \mathbf{v} = 5/5 \begin{pmatrix} 1 \\ 2 \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$$