Sheet #2

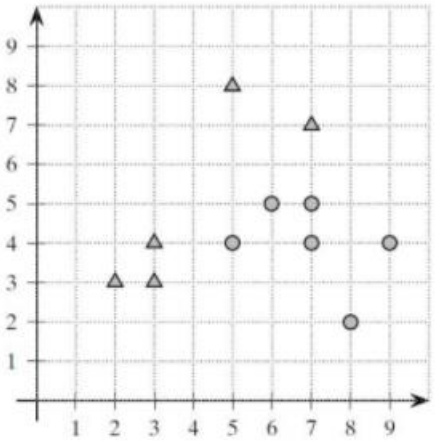
Orthogonal Projection

1. For the given vectors u1 and u2
   a. Verify u1 and u2 are orthogonal.
   b. Find the projection of the point y= [6, 3, -2] ^{T} on u1 and u2

$$\mathbf{u_1} = \begin{bmatrix} 3 \\ 4 \\ 0 \end{bmatrix}, \text{ and } \mathbf{u_2} = \begin{bmatrix} -4 \\ 3 \\ 0 \end{bmatrix}$$

LDA

2. For the data on two class problem
   a. Compute μ_{+1} and μ_{-1} and B, the between-class scatter matrix.
   b. Find the best direction w that discriminates between classes and sketch it.



Given $S^{-1} = \begin{pmatrix} 0.056 & -0.029 \\ -0.029 & 0.052 \end{pmatrix}$

3. **Midterm Question Fall 2017**
   For the data on two class problem
   a. Compute $\mu+1$ and $\mu-1$ and B, the between-class scatter matrix.
   b. Compute S+1 and S−1 and S, the within-class scatter matrix.
   c. Visually sketch the best direction that splits the data into the two classes.

i	x	y_i
X1	(1,1)	1
X2	(2,1)	1
X3	(1,2)	1
X4	(2,2)	-1
X5	(3,2)	-1