

Problem 1: first row a, b, c, d. belongs to $\delta=2$, because for large distance instances i and j their similarity is lower than the second row e, f, g, h. in photo we can see the first row's color is darker than the second row.

d, h are not correct because for $P_{3,12}$ should be equal to $P_{12,10}$

b, f are not correct because 2 points which are near to each other are darker than the 2 points which are far from each other, it should be lighter.

c, d are not correct, because for first cluster it should be 4 points but there are only 3 points.

So the correct one is (a) for $\delta=2$ and (e) for $\delta=5$

problem 2:

$$f(x) = \delta(X \cdot W_1) W_2$$

$$= X W_1 W_2$$

$$X \in \mathbb{R}^{n \times D}$$

$$W_1 \in \mathbb{R}^{D \times K}$$

$$W_2 \in \mathbb{R}^{K \times 1}$$

if $K < D$

there is always error when doing upsampling from K to D dimension,

so the reconstruction error can't be 0.

if $\text{rank}(X) \leq K$, then it could be possible.