Linear Classification B

Consider problem of classification into three classes and a 2D space of signs $\mathbf{x} = [x_1, x_2]^\top$. Foe each class we have following data (transposition will be left out for simplified notation, but all vectors are implicitly in columns.

A: $\mathcal{T} = \{[2, 3.5], [3, 3.5]\}$

B: $\mathcal{T} = \{[4, 1.0], [5, 2.0]\}$

C: $\mathcal{T} = \{[6, 4.5], [8, -1.0]\}$

Find parameters of discrimination function so that

$$s^* = \arg\max_{s \in S} f_s(\mathbf{x}) \tag{1}$$

will clasificate these data without mistakes. Discrimination function is linear (affine), in form of

$$f_s(\mathbf{x}) = \mathbf{w}_s^\top \mathbf{x} + w_{s0} \tag{2}$$

For every class, we are trying to find three numbser. For completeness we point out, that valid result is not a drawing lines into graph, but finding three numbers for each of these classes.