Solution 8

1. See Example 2.1 (p42) in Note 1.

2. (a) In machine learniag, when optimizing an objective function, we can replace the inaer product in it by a so-called kernel function $K(u, v)$.

   (b) Since the dual SVM problem depends only on inser products, we can replace the inner products by $K(u, e)$:

$$\max\nolimits_{\Omega} W(a) = \sum_{i=1}^{m} a_i = \frac{1}{2} \sum_{i,j=1}^{m} y^{(0)} y^{(j)} \alpha_i \alpha_j K\left(x^{(\theta)}, x^{(j)}\right)$$
$$\text{s.t. } \alpha_i \geq 0, i = 1, \ldots, m$$
$$\sum_{i=1}^{m} a_i y^{(0)} = 0$$