Chapter 2 Solutions

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Ex. 2.1

Given any t probability vector, is it true that only one of its elements determines the best fit for some y? $\min ||t-y|| = \min_k \sum_i (x_i - t_i)^2 = \min_k \sum_i ({y_i}^2 + {t_i}^2 - 2x_i t_i)$. Now, the sum of ${y_i}^2$ and ${t_i}^2$ both always equals 1 since they are probability vectors. Thus, we ignore these terms in making our decision. The last term in the sum, however, will be zero except for the term where $y_i = 1$. And this term is multiplied by t_k. And since this term is being subtracted, we want to maximize it to minimize $\min ||t - y||$. Thus, choosing the closest target

$$\begin{aligned}(x+y)^3 &= (x+y)^2(x+y) \\ &= (x^2 + 2xy + y^2)(x+y) \\ &= (x^3 + 2x^2y + xy^2) + (x^2y + 2xy^2 + y^3) \\ &= x^3 + 3x^2y + 3xy^2 + y^3\end{aligned} \tag{1}$$