

$$Y_{\text{xylytol}} = 25.90 + 4.45X_1 + 1.46X_2 - 0.75X_3 - 0.68X_4 + 0.008X_1^2 - 3.64X_2^2 + 0.27X_3^2 - 1.35X_4^2 + 0.36X_1X_2 + 1.42X_1X_3 - 0.33X_1X_4 + 3.7X_2X_3 - 0.15X_2X_4 - 2.8X_3X_4 \quad (1)$$

$$N = 2^k + 2k + 6 \quad (1)$$

$$Y_i = \beta_0 + \sum_{i=1}^k \beta_i X_i + \sum_{i=1}^k \beta_{ii} X_i^2 + \sum_{i < j} \beta_{ij} X_i X_j + \varepsilon \quad (2)$$

$$Y_p = f_2[w^0 \times f_1 \times (w^H \times \text{input vector} + b^H) + b^0] \quad (3)$$

$$MSE = \frac{1}{N} \sum_{i=1}^N (Y_a - Y_p)^2 \quad (4)$$

$$\text{Maximize } Y = f(x, w), x_i^L \leq x_i \leq x_i^u, i = 1, 2, 3 \dots P \quad (5)$$