In this problem, we will solve a large diet problem. There are 7035 kinds of food listed, and 30 nutrients. We want to find a diet that has the minimum level of cholesterol intake and at the same time satisfies all the nutritional requirement.

For each nutrient $i$, let $m_i$ be the minimum daily intake of $i$ and let $M_i$ be the maximum daily intake of $i$. For each food $j$, let $a_{ij}$ be the amount of nutrient $i$ in food $j$. Let $chol_j$ be the amount of cholesterol in food $j$, and define variables $x_j$ to be the amount of food $j$ in the daily diet. Then, the formulation of the diet problem is:

$$\min \quad \sum_{j=1}^{7035} chol_j \cdot x_j \tag{1}$$

$$\text{s.t.} \quad \sum_{j=1}^{7035} a_{ij} x_j \leq M_i, \quad \forall i = 1, \ldots, 30 \tag{2}$$

$$\sum_{j=1}^{7035} a_{ij} x_j \geq m_i, \quad \forall i = 1, \ldots, 30 \tag{3}$$

$$x_j \geq 0, \forall j = 1, \ldots, 7035 \tag{4}$$

Suppose you wanted to solve it using the student (free) version of Xpress, which cannot handle 7035 variables. Apparently, you need to solve the problem in a more clever way. Column generation is an ideal choice. The