

The following problem is taken from the web site with URL
http://www.hsor.org/what_is_or.cfm

HSOR.org is a project sponsored by IME-WSU (Industrial & Manufacturing Engineering Department of Wayne State University), INFORMS (Institute for Operations Research and the Management Sciences), and the NSA (National Security Agency). The project is run by Drs. Kenneth Chelst and Tom Edwards.

Two foods are to be mixed to create a diet which must satisfy requirements on the amounts of various vitamins and calories in the diet. To keep the problem relatively small we use 3 vitamins and the calories in the two foods. In the classic problem statement there are many foods that could be mixed and many different vitamins and calorie levels. The table shows the calories/oz, units of vitamins/oz, and the cost/oz of each food in the mix. The requirements are that there should be at least 300 units of vitamin C, at most 500 units of vitamin D and at most 250 units of vitamin E. There must be between 1700 and 2000 calories in the diet. Finally, no more than 7 ounces of food 1 should be used.

Note that the calorie condition would be written as 2 separate constraints: a '<=2000' constraint and a '>=1700' constraint. The total number of constraints will be 6.

The first step is to define the variables:

**X = number of ounces of food 1 in the diet
 Y = number of ounces of food 2 in the diet**

	\$.75/oz	\$.60/oz	
	X	Y	
Vitamins			Amount
C	30	20	> = 300
D	40	25	< = 500
E	12	15	< = 250
Calories	150	100	>= 1700 and <= 2000

**Minimize $C(x,y) = .75X + .60Y$
 subject to $X \geq 0, Y \geq 0$, and**

- 1. $30X + 20Y \geq 300$ (Vitamin C constraint)**
- 2. $40X + 25Y \leq 500$ (Vitamin D constraint)**
- 3. (fill in)**
- 4. (fill in)**
- 5. (fill in)**
- 6. $X \leq 7$**