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1.5

* Let: x_1 = Servings of Raw carrots
x_2 = _____ Baked potatoes
x_3 = _____ wheat bread
x_4 = _____ Cheddar cheese
x_5 = _____ Peanut butter

* Objective:

$$\text{minimize } f(x) = 0.14x_1 + 0.12x_2 + 0.2x_3 + 0.75x_4 + 0.15x_5$$

s.t

$$x_i \geq 0,\ i = 1 \dots 5$$

$$23x_1 + 171x_2 + 65x_3 + 112x_4 + 188x_5 \geq 2000$$

$$0.1x_1 + 0.2x_2 + 9.3x_4 + 16x_5 \geq 50$$

$$0.6x_1 + 3.7x_2 + 2.2x_3 + 7x_4 + 7.7x_5 \geq 100$$

$$6x_1 + 30x_2 + 15x_3 + 2x_5 \geq 250$$

1.6

a)

* Let x_i = # item i to take, $i = 1 \dots 7$

* Objective:

$$\text{maximize } f(x) = \sum_{i=1}^{7} x_i n_i$$

s.t

$$x_i \leq 1,\ x_i \in \mathbb{N},\ i = 1 \dots 7$$

$$\sum_{i=1}^{7} x_i v_i \leq 3.6$$

b)

* Let x_{ij} = # of item i in vehicle j ($i = 1 \dots 7$, $j = 1, 2$)

* Objective:

$$\text{maximize } f(x) = \sum_{j=1}^{2} \sum_{i=1}^{7} x_{ij} v_i$$

s.t

$$x_{ij} \leq 2;\ x_{ij} \in \mathbb{N},\ i = 1 \dots 7;\ j = 1, 2$$

$$x_{i1} + x_{i2} = 2,\ i = 1 \dots 7$$

$$\sum_{i=1}^{7} x_{ij} v_i \leq 3.6,\ j = 1, 2$$

$x_{ij} \geq 0; \quad i = 1 \ldots 7, \quad j = 1, 2$

If this LP has a feasible solution: x_{ij} is the # of item i in vehicle j