Widgets International, LTD.

A company makes three types of widgets. Type 1 widget requires 10 lbs. of essence of widget to produce while types 2 and 3 require 10 and 20 lbs., respectively. Type 1 and type 3 widgets are also put through a widget enhancement process to increase their value. This requires 2 hours for a batch of 100 type 1 widgets and 3 hours for a batch of 100 type 3 widgets. There are only 5 hours of enhancement processing available per day. The total number of daily production hours, excluding the widget enhancement time, is limited to 7. The widgets take 2, 1, and 3 hours to produce 100 widget batches of the type 1, type 2, and type 3 widgets, respectively. If there are only 4000 lbs. of essence of widget available per day and the per widget profits are \$3, \$2, and \$4 for types 1, 2, and 3 widgets, respectively, then what is the daily production schedule that maximizes profit?

The plant manager has formulated this problem as an LP with initial tableau

	x_1	x_2	x_3	x_4	x_5	x_6		b
(essense of widget)	10	10	20	1	0	0		4000
(enhancement time)	.02	0	.03	0	1	0		5
(production time)	.02	.01	.03	0	0	1		7
	3	2	4	0	0	0		0

The associated optimal tableau is

	x_1	x_2	x_3	x_4	x_5	x_6		b
(essense of widget)	0	1	.5	.1	−50	0		150
(enhancement time)	1	0	1.5	0	5	0		250
(production time)	0	0	−.005	−.001	−.5	1		.5
	0	0	−1.5	−.2	−50	0		−1050

1. What is the breakeven profit level for widget type 3?

2. What is the range of variation in the *essense of widget* resource for which the currently optimal basis remains optimal?

3. What is the range of variation in the profit level for type 2 widget for which the currently optimal basis remains optimal?