21.

a) Linear Programming Model

Materials	Tons Produced: Fuel Additive	Solvent	tons available
Material 1	2/5	1/2	20
Material 2	0	1/5	5
Material 3	3/5	3/10	20

To find the constraints I used the technique used on the golf bag problem and found:

$$\max \quad 40x_1 + 30x_2$$

Such that

$\frac{2}{3}x_1 + \frac{1}{2}x_2 \leq 20$ 1) on graph

$\frac{1}{5}x \leq 5$ 2) on graph

$\frac{3}{5}x_1 + \frac{3}{10}x_2 \leq 21$ 3) on graph

$x_1, x_2 \geq 0$

x_1 = # tons of fuel additive produced

x_2 = # tons of solvent produced

b) See graph paper for feasible solutions in shaded region. Then I plotted the line $40x_1 + 30x_2 = 600$ 4) on graph and slid the line to find the optimal solution to be where lines 1) and 3) intersect at $x_1 = 25$ tons, $x_2 = 20$ tons. The maximum profit is $40(25) + 30(20) = \$1600$.

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