LINEAR PROGRAMMING FORMULATION OF THE JUICE MIXERS PROBLEM

Decision variables: $x_{i,j}$, $i = 1, 2$, $j = 1, 2, 3$, where the meaning of $x_{i,j}$ is the amount of ingredient number j we blend in to juice number i. (First juice is Tropical Breeze, second is Guava Jive. The ingredients are grape, guava and papaya, respectively.)

$$
\begin{array}{rl}
\max & 1.3(x_{1,1} + x_{1,2} + x_{1,3}) + 1.5(x_{2,1} + x_{2,2} + x_{2,3}) \\
\text{s.t.} & x_{1,1} + x_{2,1} \leq 1000 \\
& x_{1,2} + x_{2,2} \leq 400 \\
& x_{1,3} + x_{2,3} \leq 300 \\
& x_{1,2} \leq 0.25(x_{1,1} + x_{1,2} + x_{1,3}) \\
& x_{1,2} \geq 0.20(x_{1,1} + x_{1,2} + x_{1,3}) \\
& x_{1,3} \leq 0.25(x_{1,1} + x_{1,2} + x_{1,3}) \\
& x_{1,3} \geq 0.20(x_{1,1} + x_{1,2} + x_{1,3}) \\
& x_{2,2} \leq 0.50(x_{2,1} + x_{2,2} + x_{2,3}) \\
& x_{2,2} \geq 0.40(x_{2,1} + x_{2,2} + x_{2,3}) \\
& x_{2,3} \leq 0.05(x_{2,1} + x_{2,2} + x_{2,3}) \\
& x_{i,j} \geq 0 \qquad i = 1, 2, \quad j = 1, 2, 3.
\end{array}
$$

The first three constraints express the limited resources (available ingredients). The next two are guava limits in drink 1, and the following two are papaya limits in drink 1. The 8th and 9th constraints are guava limits in drink 2, and the 10th constraint is the papaya limit in drink 2. (Notice that we don't need two bounds here, as the lower bound is just nonnegativity.) Finally, the last constraint (which is actually six constraints with shorthand notation) is just the simple nonnegativity, coming from common sense.