Math 30210 — Introduction to Operations Research

Quiz 2 – Wednesday September 12, 2007

NAME: _____

Instructions: This is a closed-book quiz. Please do not use any notes.

A linear programming problem is in *standard form* if all variables are constrained to be non-negative, and all constraints are equalities with constant, non-negative right-hand side.

Convert the following LP (the diet problem from last week) into an LP in standard form.

Minimize
$$3.8K + 6.2C$$

subject to $K, C \geq 0$ and

$$
\begin{array}{rcrcl}
& & .1K + .25C & \geq & 1 \\
& & K + .25C & \geq & 5 \\
900 & \leq & 110K + 120C & \leq & 1500.
\end{array}
$$

Solution:
We introduce three surplus variables, s_1, s_2 and s_3, to turn the first two constraints and the left-hand inequality in the third constraint into equalities, and a slack variable s_4 to turn the right-hand inequality in the third constraint into an equality. The complete LP becomes:

Minimize
$$3.8K + 6.2C$$

subject to $K, C, s_1, s_2, s_3, s_4 \geq 0$ and

$$
\begin{array}{rcl}
.1K + .25C - s_1 & = & 1 \\
K + .25C - s_2 & = & 5 \\
110K + 120C - s_3 & = & 900 \\
110K + 120C + s_4 & = & 1500.
\end{array}
$$