[12] **5.** Consider the LP maximize $x_1 + ax_2$ subject to $x_1 + x_2 \leq 1$ and $x_1 + 2x_2 \leq b$ and $x_1, x_2 \geq 0$, where a and b are real parameters. Introducing slack variables, x_3, x_4 (x_3 for the first inequality), here is one possible dictionary:

$$\begin{array}{rcccc} x_1 & = & 2-b & -2x_3 & +x_4 \\ x_2 & = & b-1 & +x_3 & -x_4 \\ z & = & 2-a-b+ab & +(a-2)x_3 & +(1-a)x_4 \end{array}$$

(a) For what range of a, b is the above dictionary optimal? Explain.

(b) Perform one regular simplex pivot to obtain a dictionary optimal when $b = 3/2$ and $a = 3$. Explain how you are choosing entering and leaving variables. For what range of a, b is this dictionary optimal?

(c) Perform one dual pivot to obtain a dictionary optimal when $b = 3$ and $a = 3/2$. Explain how you are choosing entering and leaving variables. For what range of a, b is this dictionary optimal?

Continued on page 8