[6] **4.** Consider the linear program: maximize $s + 10t + r$ subject to $2s + 5t + r \leq 16$, $3s + t - 3r \leq 12$, $4s + 3t + 3r \leq 20$, and $t, r \geq 0$, but where s can be negative, zero, or positive. Replace s by two variables, namely $s = s_1 - s_2$, where we impose the condition $s_1, s_2 \geq 0$.

(a) The three constraints of this LP can be written as

$$[\text{“big } A\text{”}] \begin{bmatrix} s_1 \\ s_2 \\ t \\ r \\ w_1 \\ w_2 \\ w_3 \end{bmatrix} = \begin{bmatrix} 16 \\ 12 \\ 20 \end{bmatrix}$$

where w_1, w_2, w_3 are slack variables. Write out the matrix “big A.”

(b) Can both s_1 and s_2 be basic in some dictionary of the simplex method? Justify your answer using (part of) “big A.”

Continued on page 6