Change in HW for 6.3

Please write up the solutions to 6.3, #6 to turn in. You should be able to show #9, but not to turn in. Additionally, write up the solutions to the following:

6.3.10 Suppose we have the following LP:

$$\begin{array}{lrrrl} \max\ z & = 3x & +2y & & \\ \text{st} & x & +y & \leq 4 \\ & 2x & +y & \leq 6 \end{array}$$

with $x, y \geq 0$. Here is the initial and final tableaux:

x	y	s_1	s_2	
-3	-2	0	0	0
1	1	1	0	4
2	1	0	1	6

x	y	s_1	s_2	
0	0	1	1	10
0	1	2	-1	2
1	0	-1	1	2

As a reminder, we said in class that the final tableau could be computed as:

$$\begin{array}{c|c} -\mathbf{c}^T + \mathbf{c}_B^T B^{-1} A & \mathbf{c}_B^T B^{-1}\mathbf{b} \\ \hline B^{-1}A & B^{-1}\mathbf{b} \end{array}$$

(a) Something is wrong with the following computation- Find out what it is and give the correct solution:

The optimal Row 0 can be computed directly as:

$$-[3,2,0,0] - [3,2]\begin{bmatrix} 0 & 1 & 2 & -1 \\ 1 & 0 & -1 & 1 \end{bmatrix} = [-1,1,4,-1]$$

(b) Once we've corrected the previous problem, add Δ to the coefficient 3 in Row 0, and show that the new Row 0 is:

$$[0 \quad 0 \quad 1-\Delta \quad 1+\Delta]$$

and the new value of z is $10 + 2\Delta$. Also, for what values of Δ will our current basis (of basic variables) remain optimal?

(c) If we change the RHS of the second coefficient from 6 to $6+\Delta$, find the new final tableau. In particular, what is the shadow price for the second constraint?

(d) Suppose we add a new column so that the equations become:

$$\begin{array}{lrrrrl} \max\ z & = 3x & +2y & +w & \\ \text{st} & x & +y & +2w & \leq 4 \\ & 2x & +y & +w & \leq 6 \end{array}$$

Will the basis $\{x_2, x_1\}$ remain optimal?