1) on Monday, giving a 2-phase optimization

$2.3

The problem "A degenerate optimal solution" is:

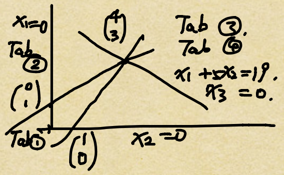
Maximize $z=3x_1+7x_2$ s.t.

$x_1+5x_2\le 19$,

$x_1-x_2\le 1$,

$-x_1+2x_2\le 2$,

$x_1, x_2\ge 0$.



The optimal solution (viewed as just a point in R5) is the same in Tableau(3) as in Tableau(4):

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{pmatrix} = \begin{pmatrix} 4 \\ 3 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

The basic solution represented by Tableau(3) (where the basic variables are x1, x4, x2) is different than in Tableau(4) (where the basic variables are x1, x5, x2).

Notes on "An Unbounded Optimal Region":

Tableau(1) represents a LPP.

A routine simplex method application arrives at Tableau(3).

In Tableau(3), the non-basic variable x4 has a "0" in the objective row.

$\rightarrow$ could potentially enter !!!

Entering x4 would lead to no change in its objective row and another optimal tableau. But no x4-column ceta-ratio has a positive denominator.

Other optimal solutions (with M>0) are:

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{pmatrix} = \begin{pmatrix} 0 \\ 5+\frac{3}{5}M \\ \frac{4}{5}+\frac{6}{15}M \\ M \\ 0 \\ 0 \end{pmatrix} \leftarrow \text{feasible for all } M.$$

($z=295-$ [illegible] $x_5-7x_6=.295$?)