Material 3 (Initialisation of the simplex algorithm, the two-phase method, the big-M method)

Exercise 1. Solve the following linear programme using the two-phase simplex method:

Min Z $=3x_1+2x_2$

$$\begin{cases} 3x_1+x_2\geq 3 \\ 4x_1+3x_2\geq 6 \\ x_1+x_2\leq 3 \\ x1, x2\geq 0 \end{cases}$$

Exercise 2. Solve the linear programme (P) using the two-phase simplex algorithm.

Max Z $=2x_1+3x_2+x_3$

$$\begin{cases} x_1+x_2+x_3\leq 40 \\ 2x_1+x_2-x_3\geq 10 \\ -x_1+x_3\geq 10 \\ x1, x2, x3\geq 0 \end{cases}$$

Exercise 3 Solve the linear programme (P) using the two-phase simplex algorithm.

Max Z $=3x_1+4x_2+5x_3$

$$\begin{cases} x_1+2x_2+3x_3\geq 5 \\ 2x_1+2x_2+x_3\geq 6 \\ x1, x2, x3\geq 0 \end{cases}$$

Exercise 4. Show that the following linear problem does not have feasible solution (suggestion: use the Big-M method).

Max Z $=12x_1+15x_2+10x_3$

$$\begin{cases} x_1+x_2+2x_3\geq 10 \\ 15x_1+6x_2-5x_3\leq 30 \\ x_1+3x_2+5x_3\leq 18 \\ x1, x2, x3\geq 0 \end{cases}$$

Exercise 5. Solve the linear programme (P) using the Big M method.

Min W $=2x_1+1x_2+4x_3$

$$\begin{cases} x_1+x_2+2x_3=3 \\ 2x_1+x_2+3x_3=5 \\ x1, x2, x3\geq 0 \end{cases}$$