

**UNIVERSITY OF WATERLOO**  
**DEPARTMENT OF MANAGEMENT SCIENCES**  
*Introduction to Optimization*  
Class Activities 1

MSCI 331

1) Consider the following LP:

$$\text{MAX } 3x + y - z + 100$$

S.T.

$$x - y \leq 25 - 5z$$

$$3x + 4y = 12 - 2z$$

$$x + y \geq z$$

$$x \text{ free, } y \leq 0, z \geq 0$$

Transform the LP into the standard form.

2) Graph the feasible sets corresponding to each of the following systems of constraints, identify the extreme feasible point (corner feasible points), and for each point list the basic and nonbasic variables:

$$\begin{aligned} &x_1 + x_2 \leq 2 \\ \text{a) } &3x_1 + x_2 \geq 3 \\ &x_1, x_2 \geq 0 \end{aligned}$$

$$\begin{aligned} &x_1 + x_2 \leq 2 \\ \text{b) } &3x_1 + x_2 = 3 \\ &x_1, x_2 \geq 0 \end{aligned}$$

$$\begin{aligned} &x_1 + x_2 = 2 \\ \text{c) } &3x_1 + x_2 = 3 \\ &x_1, x_2 \geq 0 \end{aligned}$$

