

620-261 Introduction to Operations Research

TUTORIAL 2

Week beginning Friday 14th March 2008

1. For each of the cases below, sketch the feasible region bounded by the constraints and label all corner points. In each case state whether the region is bounded, unbounded or empty.

(a)

$$\begin{aligned}x + y &\leq 30 \\2x + y &\leq 40 \\x &\leq 15 \\x \geq 0, y &\geq 0.\end{aligned}$$

(b)

$$\begin{aligned}x + y &\geq 30 \\2x + y &\leq 40 \\x &\geq 15 \\x \geq 0, y &\geq 0.\end{aligned}$$

(c)

$$\begin{aligned}x + y &\geq 30 \\2x + y &\geq 40 \\x &\geq 15 \\x \geq 0, y &\geq 0.\end{aligned}$$

For each of the cases above, find the **maximum** AND **minimum** values (if they exist) for the following objective functions:

(i) $z = 6x + 3y$,

(ii) $z = 2x + 4y$.

2. Sketch the feasible region bounded by the following constraints:

$$\begin{aligned}x - y &\geq -10 \\2x + y &\geq 10 \\3x - y &\leq 45 \\x + 2y &\leq 50 \\x \geq 0, y &\geq 0.\end{aligned}$$

Find the optimal values (**maxima** AND **minima**) for each of the functions below, over the feasible region that you have just sketched.

(a) $z_1 = x + 2y$,

(b) $z_2 = 2x - y$,

(c) $z_3 = 3x + y$.