



**Senior Math Circles
Fall 2010
Linear Programming 2**

1. Consider the following problem (P):

$$\begin{array}{rcll}
 \text{maximize} & 2x_1 & + & 3x_2 \\
 \\
 \text{subject to} & 2x_1 & + & x_2 & \leq & 10 & (1) \\
 & x_1 & + & x_2 & \leq & 6 & (2) \\
 & -x_1 & + & x_2 & \leq & 4 & (3) \\
 & x_1 & & & \geq & 0 & (4) \\
 & & & x_2 & \geq & 0 & (5)
 \end{array}$$

- (a) Sketch (P)
- (b) Find the co-ordinates of each corner of (P). What constraints are associated with each corner?
- (c) Which corner has the largest value for the objective function $2x_1 + 3x_2$?
- (d) On the same diagram, draw the lines

$$\begin{array}{l}
 2x_1 + 3x_2 = 0 \\
 2x_1 + 3x_2 = 5 \\
 2x_1 + 3x_2 = 10 \\
 2x_1 + 3x_2 = 15 \\
 2x_1 + 3x_2 = 17 \\
 2x_1 + 3x_2 = 20
 \end{array}$$