H/W # 1

(1) Consider the graphical representation of the following linear programs

Maximize (or minimize) $Z = 3x_1 + 2x_2$

subject to $x_1 + 2x_2 \geq 4$, $x_1 \leq 3$, $x_2 \leq 2$, $x_1 + x_2 \geq 5$, $x_1, x_2 \geq 0$.

(a) In each of the following cases indicate if the feasible region has one point, infinite nuber of point, or no points.

(i) The constraints are as given above.

(ii) The constraint $x_1 + x_2 \geq 5$ is changed to $x_1 + x_2 \geq 3$.

(iii) " " " " " " " $x_1 + x_2 \geq 7$.

(b) For each cases in (a), ~~in which~~ determine the number of Feasible extreme points, if any.

(c) For the cases in (a) in which a Feasible Solution exists determine the maximum and minimum values of Z and their associated extreme points.

(2) Solve graphically

(i) Max. $Z = x_1 + x_2$

subject to $x_1 + 5x_2 \leq 5$, $2x_1 + x_2 \leq 4$, $x_1, x_2 \geq 0$

Ans: $(5/3, 2/3)$
$Z = \frac{7}{3}$

(ii) Max $Z = 2x_1 + 3x_2$

S/t $x_1 + x_2 \leq 4$, $2x_1 + x_2 \geq 2$, $x_1, x_2 \geq 0$

Ans: $(0, 4)$

(iii) Min $Z = 4x_1 + 2x_2$

S/t
$x_1 + x_2 \leq 4$
$x_1 + 2x_2 \geq 2$
$2x_1 + x_2 \geq 2$
$x_1 \leq 3$
$x_2 \leq 3$
$x_1, x_2 \geq 0$

Ans: All the points on the line segment joining $(0,2)$ and $(\frac{2}{3}, \frac{2}{3})$

(IV) Max $Z = x_1 + x_2$

S/t
$3x_1 - 4x_2 \geq -3$
$-x_1 - x_2 \leq 0$
$x_1, x_2 \geq 0$

Ans: Unbounded Solution.