

$$\max Z = 2x_1 + x_2$$

s.t.

$$x_1 + x_2 \leq 10$$

$$-x_1 + x_2 \geq 2$$

$$x_1, x_2 \geq 0$$

$$Z = 2x_1 + x_2$$

$$S_1 = 10 - x_1 - x_2$$

$$\rightarrow S_2 = 2 + x_1 - x_2$$

$$\text{Set } (0,0) = (x_1, x_2)$$

$$(S_1, S_2) = (10, 2)$$

$$Z = 0$$

increasing x_1

$$\begin{cases} x_1 = 10 - x_2 - S_1 \rightarrow x_1 \leq 10 \checkmark \\ x_1 = -2 + x_2 - S_2 \rightarrow x_1 \geq -2 \end{cases}$$

$$\max Z = 20 - x_2 - 2S_1$$

$$x_1 = 10 - x_2 - S_1$$

$$S_2 = 12 - 2x_2 - S_1$$

$$\text{Set } (x_1, x_2) = (10, 0)$$

$$\Rightarrow (S_1, S_2) = (0, 12)$$

$$\text{Ans. } (x_1, x_2) = (10, 0) \quad Z = 20$$

