

(1) [15] For the following system of linear inequalities:

(i) [10] Neatly graph the system.

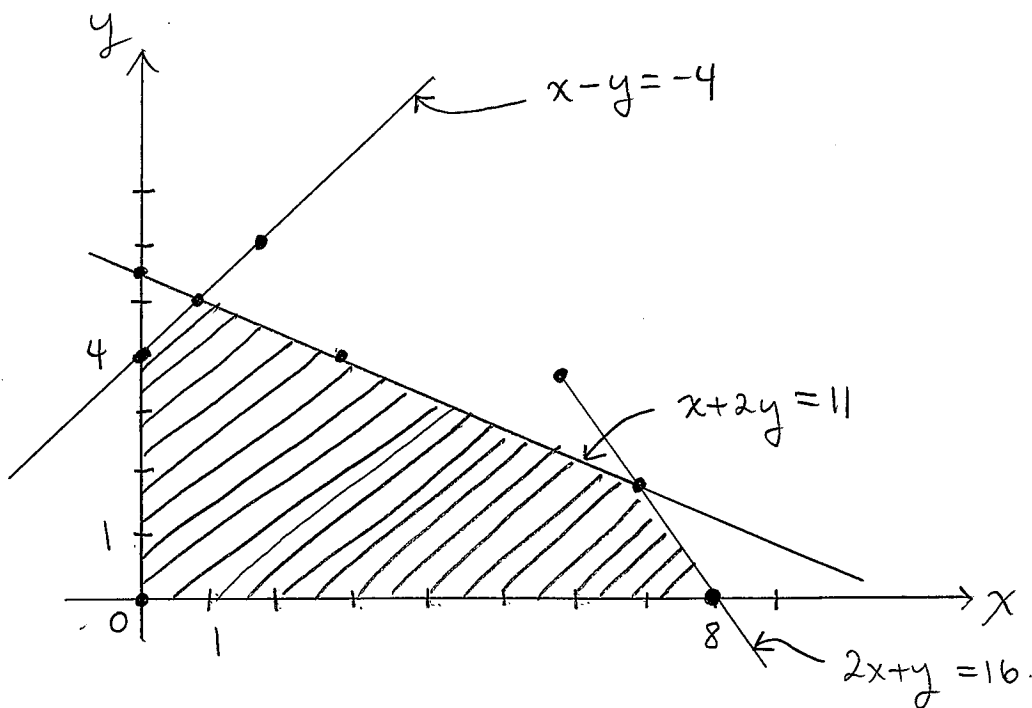
(ii) [4] Determine all corner points.

(iii) [1] State whether the resulting graph is bounded or unbounded.

$$\begin{aligned} x - y &\geq -4 \\ x + 2y &\leq 11 \\ 2x + y &\leq 16 \\ x &\geq 0 \\ y &\geq 0 \end{aligned}$$

(i)

Inequality	Line	Test pt	test
$x - y \geq -4$	$x - y = -4$	$(0, 0)$	$0 - 0 \stackrel{?}{\geq} -4$ : true.
$x + 2y \leq 11$	$x + 2y = 11$	$(0, 0)$	$0 + 2(0) \stackrel{?}{\leq} 11$ : true.
$2x + y \leq 16$	$2x + y = 16$	$(0, 0)$	$2(0) + 0 \stackrel{?}{\leq} 16$ : true.



(ii) Corner Points: By inspection:  $(0,0), (0,4), (8,0)$ .

$$\left. \begin{array}{l} x - y = -4 \\ x + 2y = 11 \end{array} \right\}$$

$$-3y = -15$$

$$y = 5$$

$$\therefore x = 1$$

$$\therefore (1, 5)$$

$$\left. \begin{array}{l} x + 2y = 11 \\ 2x + y = 16 \end{array} \right\}$$

$$\left. \begin{array}{l} 2x + 4y = 22 \\ 2x + y = 16 \end{array} \right\}$$

$$3y = 6$$

$$y = 2$$

$$\therefore x = 7$$

$$\therefore (7, 2)$$

$\therefore$  Corner points are  $(0,0), (0,4), (8,0), (1,5), (7,2)$ .

(iii) Graph is bounded.