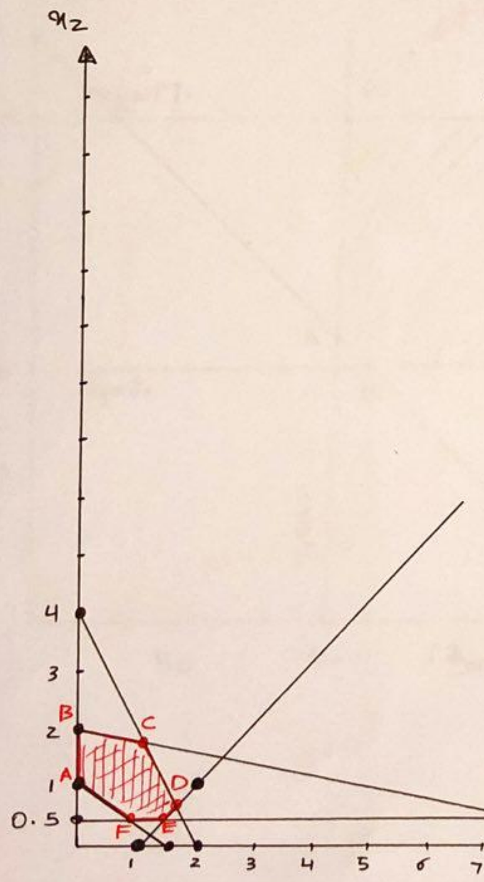
Assignment 1 — Question 1 :

$Z = 2x_1 + x_2$ (objective)

Constraints :
$$\begin{cases} 2x_1 + 3x_2 \geq 3 \\ x_1 + 5x_2 \leq 10 \\ 2x_1 + x_2 \leq 4 \\ x_1 - x_2 \leq 1 \\ 4x_2 \geq 2 \\ x_1 , x_2 \geq 0 \end{cases}$$

	A	B	C	D	E	F
	(0,1)	(0,2)	(1.11, 1.77)	$(\frac{5}{3}, \frac{2}{3})$	(1.5, 0.5)	(0.75, 0.5)
Z	1	2	4	4	3.5	2

This problem has a unique optimal solution $\begin{cases} x_1 = 0 \\ x_2 = 1 \end{cases}$



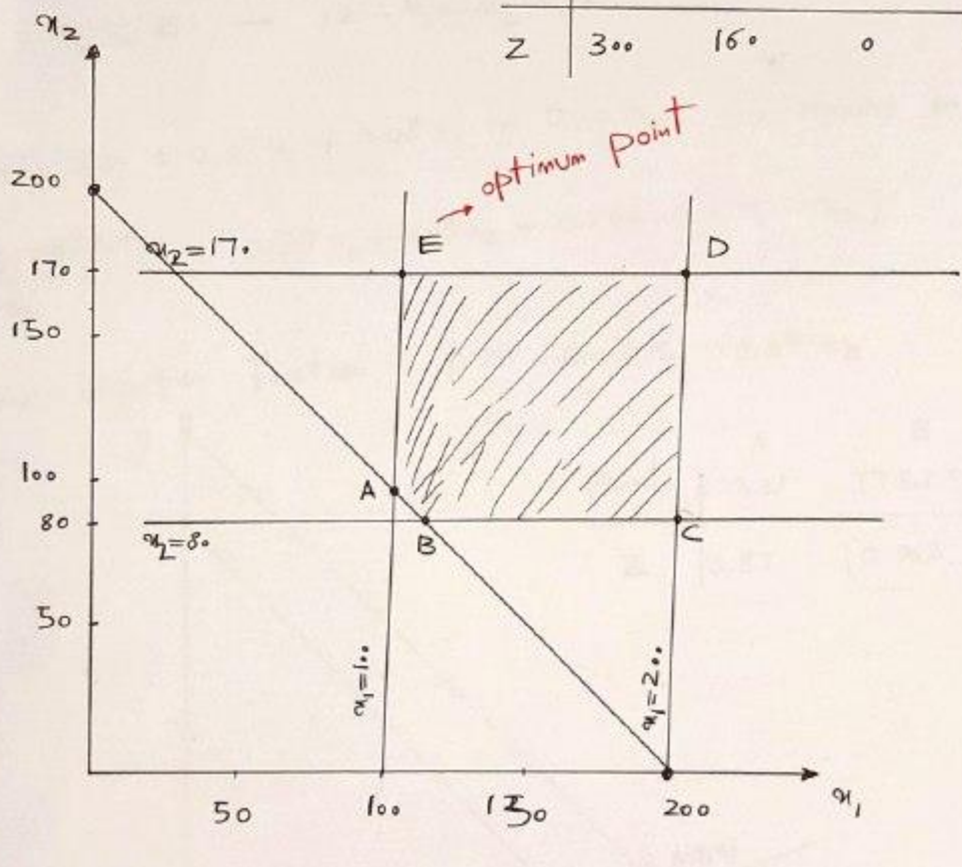
Assignment 1 — Question 2:

$x_1 \geqslant 100$ $\quad$ $x_1 \leqslant 200$ $\quad$ $x_1 + x_2 \geqslant 200$

$x_2 \geqslant 80$ $\quad$ $x_2 \leqslant 170$

objective function: $-2x_1 + 5x_2$

	(100,100)	(120,80)	(200,80)	(200,170)	(100,170)
	A	B	C	D	E
Z	300	160	0	450	650



Assignment 1 — Question 3:

$x_1 + x_2 + x_3 = 12 \rightarrow x_3 = 12 - x_1 - x_2$

$x_1 \geqslant 3x_2$

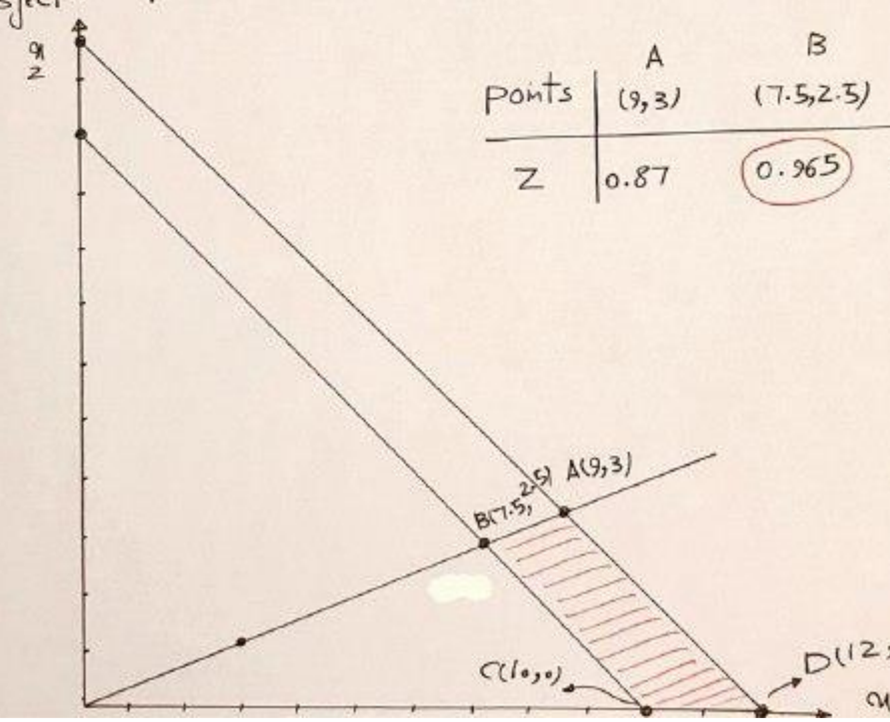
$x_1 \geqslant 0 \;,\; x_2 \geqslant 0 \;,\; x_3 \geqslant 0 \xrightarrow[\text{by substituting}]{\text{for } x_3} 12 - x_1 - x_2 \geqslant 0$

$x_3 \leqslant 2 \rightarrow 12 - x_1 - x_2 \leqslant 2$

objective : $0.07x_1 + 0.08x_2 + 0.12x_3 \rightarrow$ should be maximized

$\xrightarrow[x_3]{\text{by substituting}}$ $0.07x_1 + 0.08x_2 + 0.12(12 - x_1 - x_2)$

Final objective function : $1.44 - 0.05x_1 - 0.04x_2$



	A	B		D
points	(9,3)	(7.5,2.5)	(10,0)	(12,0)
Z	0.87	0.965	0.94	0.84