5a) minimize: $-5x_1 + 3x_2$ subject to:

$$x_1 - x_2 \leq 1$$
$$2x_1 - x_2 \leq 2$$
$$x_1, x_2 \geq 0$$

convert to standar form –

maximise $5x_1 - 3x_2$ (same constraints)

Slack form –

$$z = 5x_1 - 3x_2$$
$$x_3 = -x_1 + x_2 + 1$$
$$x_4 = -2x_1 + x_2 + 2$$
$$x_1, x_2, x_3, x_4 \geq 0$$

basic solution #1 – $(0,0,1,2) \Rightarrow z = 0$

pivot 1: choose x_1, x_3

$z = 5(1 + x_2 - x_3) - 3x_2 = 5 + 2x_2 - 5x_3$

$x_1 = 1 + x_2 - x_3$

$x_4 = -2(1 + x_2 - x_3) + x_2 + 2 = -x_2 + 2x_3$

basic solution #2 – $(1,0,0,0) \Rightarrow z = 5$

pivot 2: choose x_2, x_4

$z = 5 + 2(2x_3 - x_4) - 5x_3 = 5 - x_3 - 2x_4$

$x_1 = 1 + (2x_3 - x_4) - x_3 = 1 + x_3 - x_4$

$x_2 = 2x_3 - x_4$

Done!

basic solution #3 – $(1,0,0,0) \Rightarrow z = 5$

So, $x_1 = 1$, $x_2 = 0$, minimum $= -5$.

D