H29 問4

(1) $z = -2x_1 + 5x_2 - 4x_3$

$x_4 = 7 - 3x_1 - 3x_2 + 5x_3$ (7/3)

$x_5 = 4 - 7x_1 + 3x_2 - 7x_3$

$x \geq 0$,

$x_2 \longleftrightarrow x_4$

$x_2 = \frac{7}{3} - x_1 - \frac{1}{3}x_4 + \frac{5}{3}x_3$ ← 12/3

$z = -2x_1 + \left(\frac{35}{3} - 5x_1 - \frac{5}{3}x_4 + \frac{25}{3}x_3\right) - 4x_3$

$= \frac{35}{3} - 7x_1 - \frac{5}{3}x_4 + \frac{13}{3}x_3$

$x_5 = 4 - 7x_1 + (7 - 3x_1 - x_4 + 5x_3) - 7x_3$

$= 11 - 10x_1 - x_4 - 2x_3$ (1/2)

$x_3 \longleftrightarrow x_5$, $x_3 = \frac{11}{2} - 5x_1 - \frac{1}{2}x_4 - \frac{1}{2}x_5$

$z = \frac{35}{3} - 7x_1 - \frac{5}{3}x_4 + \left(\frac{143}{6} - \frac{65}{3}x_1 - \frac{13}{6}x_4 - \frac{13}{6}x_5\right)$ ← 21/3, 86/3

$\frac{35}{3} + \frac{143}{6} = \frac{213}{6} = \frac{71}{2}$

$z = \frac{35}{3} - \frac{86}{3}x_1 - \frac{23}{6}x_4 - \frac{13}{6}x_5$

$z^* = \frac{35}{3}$, $(x_1, x_4, x_5) = (0, 0, 0)$, $(x_3 = \frac{11}{2}$, $x_2 = \frac{7}{3} + \frac{5}{3}x_3 = \frac{14}{6} + \frac{55}{6} = \frac{69}{6} = \frac{23}{2})$

(2) (D) $\min\ 7y_1 + 4y_2$

s.t. $3y_1 + 7y_2 \geq -2$

$3y_1 - 3y_2 \geq 5$

$-5y_1 + 7y_2 \geq -4$

$y_1 \geq 0$.

$3y_1 - 5 \geq 3y_2$

$y_2 \geq -\frac{3}{7}y_1 - \frac{2}{7}$

$y_2 \leq y_1 - \frac{5}{3}$

$y_2 \geq \frac{5}{7}y_1 - \frac{4}{7}$

$\rightarrow 0 = \frac{2}{7}y_1 - \frac{5}{3} + \frac{4}{7}$

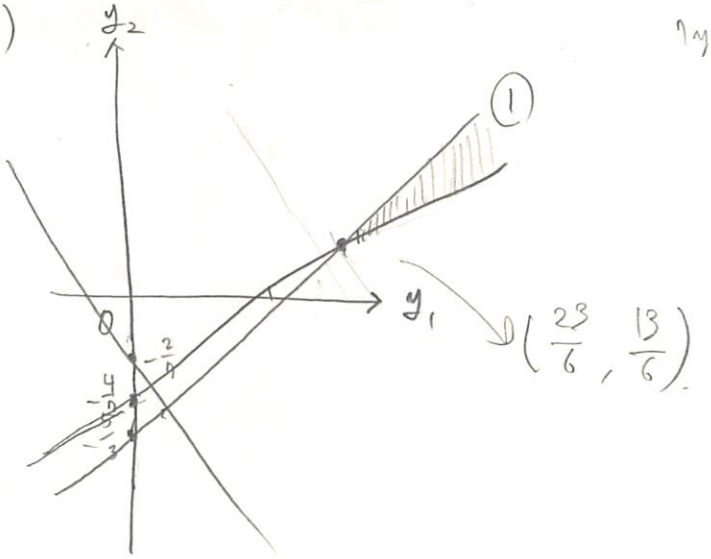
$\frac{2}{7}y_1 = \frac{23}{21}$

$\frac{-35 + 12}{21} = -\frac{23}{21}$

$y_1 = \frac{23}{6}$

$y_2 = \frac{13}{6}$

(3)



$7y_1 + 4y_2 = k$

$y_2 = -\frac{7}{4}y_1$

$\frac{161}{6} + \frac{52}{6} = \frac{213}{6}$