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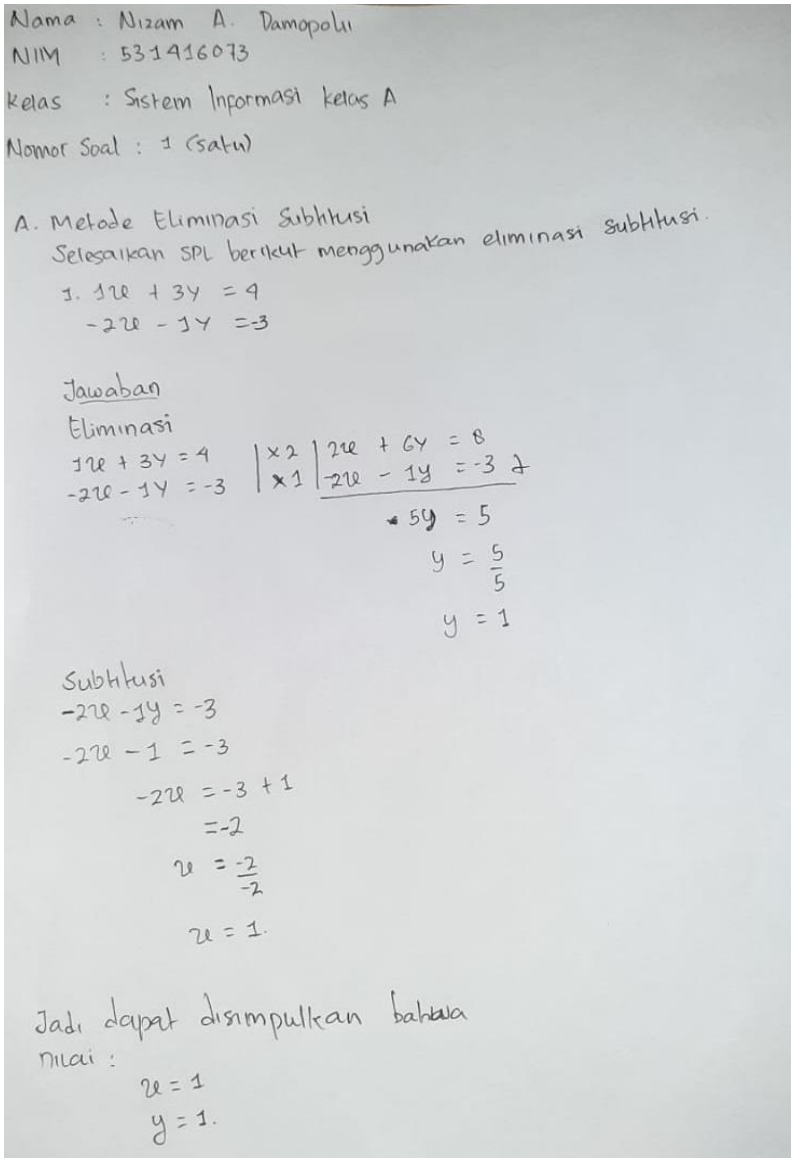
No.Soal : 1

1. Metode Eliminasi Subtitusi



2. Metode Geometrik

B. Metode Geometrik

Selesaikan SPL berikut menggunakan metode Geometrik

1. $1x + 3y = 4$
   $-2x - 1y = -3$

Jawaban

$1x + 3y = 4$

$x = 0$

$1.0 + 3y = 4$

$3y = 4$

$y = \frac{4}{3}$

$y = 1{,}3$ $(0, 1.3)$

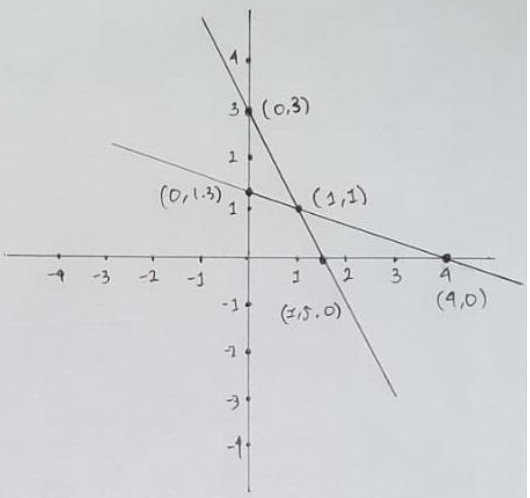
$y = 0$

$1x + 3.0 = 4$

$1x = 4$

$x = \frac{4}{1}$

$x = 4$ $(4, 0)$



$-2x - 1y = -3$

$x = 0$

$-2.0 - 1y = -3$

$-1y = -3$

$y = \frac{-3}{-1}$

$y = 3$ $(0, 3)$

$y = 0$

$-2x - 1.0 = -3$

$-2x = -3$

$x = \frac{-3}{-2}$

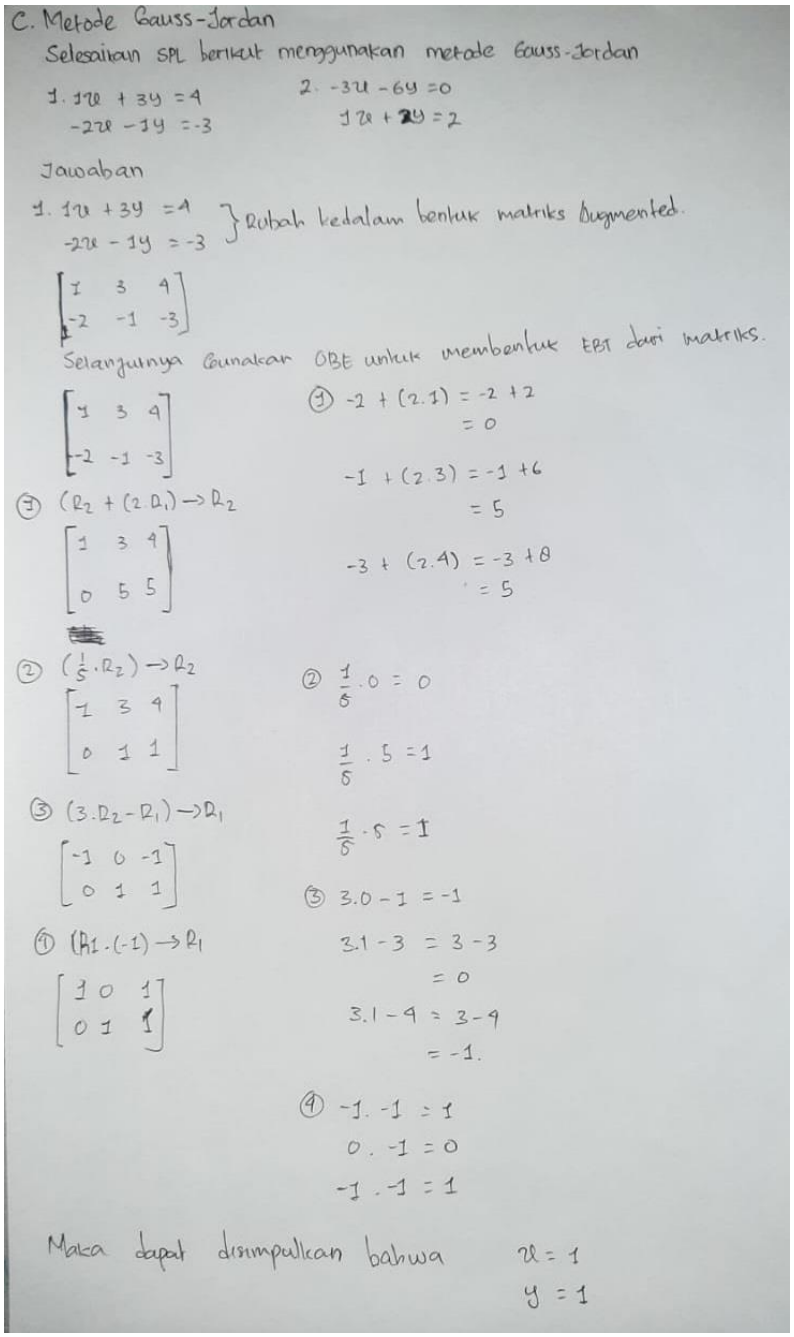
$x = 1.5$ $(0, 1.5)$

Jadi dapat disimpulkan

$x = 1$

$y = 1.$

3. Metode Gauss-Jordan



C. Metode Gauss-Jordan

Selesaikan SPL berikut menggunakan metode Gauss-Jordan

1. $1x + 3y = 4$
   $-2x - 1y = -3$

2. $-3x - 6y = 0$
   $1x + 2y = 2$

Jawaban

1. $1x + 3y = 4$
   $-2x - 1y = -3$
   } Rubah kedalam bentuk matriks Augmented.

$$\begin{bmatrix} 1 & 3 & 4 \\ -2 & -1 & -3 \end{bmatrix}$$

Selanjutnya Gunakan OBE untuk membentuk EBT dari matriks.

$$\begin{bmatrix} 1 & 3 & 4 \\ -2 & -1 & -3 \end{bmatrix}$$

① $(R_2 + (2.R_1) \rightarrow R_2$

$$\begin{bmatrix} 1 & 3 & 4 \\ 0 & 5 & 5 \end{bmatrix}$$

① $-2 + (2.1) = -2 + 2$
$= 0$

$-1 + (2.3) = -1 + 6$
$= 5$

$-3 + (2.4) = -3 + 8$
$= 5$

② $(\frac{1}{5}.R_2) \rightarrow R_2$

$$\begin{bmatrix} 1 & 3 & 4 \\ 0 & 1 & 1 \end{bmatrix}$$

② $\frac{1}{5}.0 = 0$

$\frac{1}{5}.5 = 1$

$\frac{1}{5}.5 = 1$

③ $(3.R_2 - R_1) \rightarrow R_1$

$$\begin{bmatrix} -1 & 0 & -1 \\ 0 & 1 & 1 \end{bmatrix}$$

③ $3.0 - 1 = -1$

$3.1 - 3 = 3 - 3$
$= 0$

$3.1 - 4 = 3 - 4$
$= -1.$

④ $(R_1.(-1) \rightarrow R_1$

$$\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$$

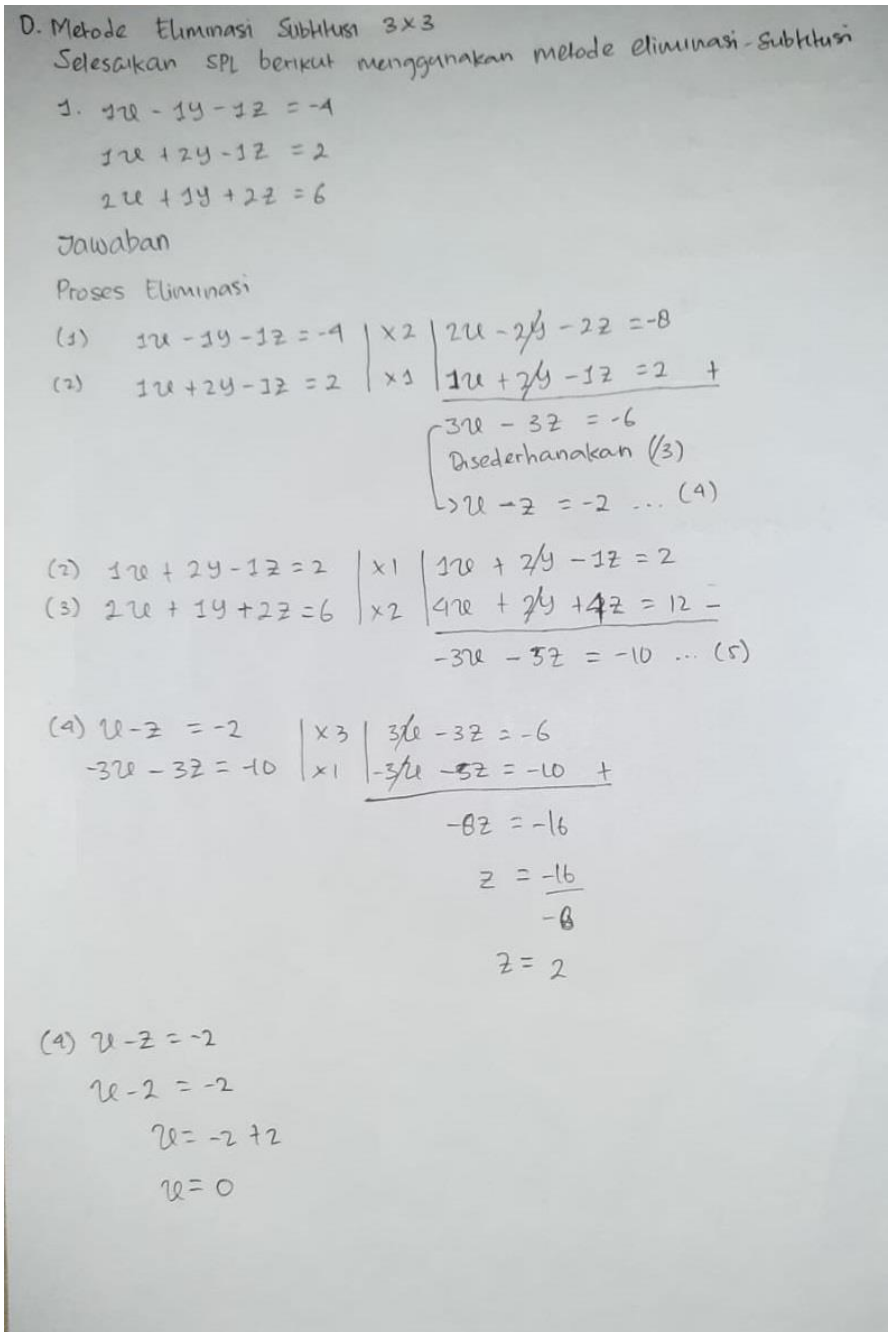
④ $-1.-1 = 1$

$0.-1 = 0$

$-1.-1 = 1$

Maka dapat disimpulkan bahwa $x = 1$
$y = 1$

4. Metode Eliminasi Subtitusi 3x3



D. Metode Eliminasi Subtitusi 3×3

Selesaikan SPL berikut menggunakan metode eliminasi-subtitusi

1. $1u - 1y - 1z = -1$
   $1u + 2y - 1z = 2$
   $2u + 1y + 2z = 6$

Jawaban

Proses Eliminasi

(1) $1u - 1y - 1z = -1$ | ×2 | $2u - 2y - 2z = -8$
(2) $1u + 2y - 1z = 2$ | ×1 | $1u + 2y - 1z = 2$ +

$3u - 3z = -6$
Disederhanakan (/3)
$\rightarrow u - z = -2 \ldots (4)$

(2) $1u + 2y - 1z = 2$ | ×1 | $1u + 2y - 1z = 2$
(3) $2u + 1y + 2z = 6$ | ×2 | $4u + 2y + 4z = 12$ −

$-3u - 3z = -10 \ldots (5)$

(4) $u - z = -2$ | ×3 | $3u - 3z = -6$
$-3u - 3z = -10$ | ×1 | $-3u - 3z = -10$ +

$-6z = -16$

$z = \frac{-16}{-8}$

$z = 2$

(4) $u - z = -2$

$u - 2 = -2$

$u = -2 + 2$

$u = 0$

Proses Substitusi

(1) ... $1x - 1y - 1z = -4$

$1(0) - 1y - 1(2) = -4$

$0 - 1y - 2 = -4$

$-1y - 2 = -4$

$-1y = -4 + 2$

$= -2$

$y = \frac{-2}{-1}$

$= 2$

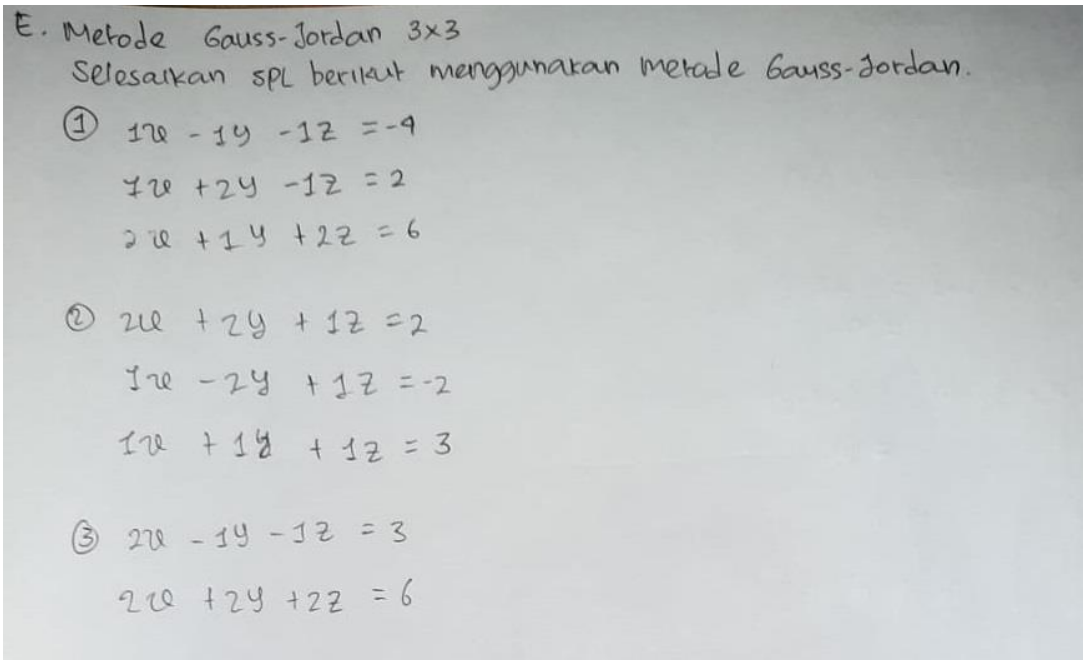
Jadi dapat disimpulkan bahwa

$x = 0$

$y = 2$

$z = 2$

5. Metode Gauss-Jordan 3x3



E. Metode Gauss-Jordan 3x3

Selesaikan SPL berikut menggunakan metode Gauss-Jordan.

① $1x - 1y - 1z = -9$

$1x + 2y - 1z = 2$

$2x + 1y + 2z = 6$

② $2x + 2y + 1z = 2$

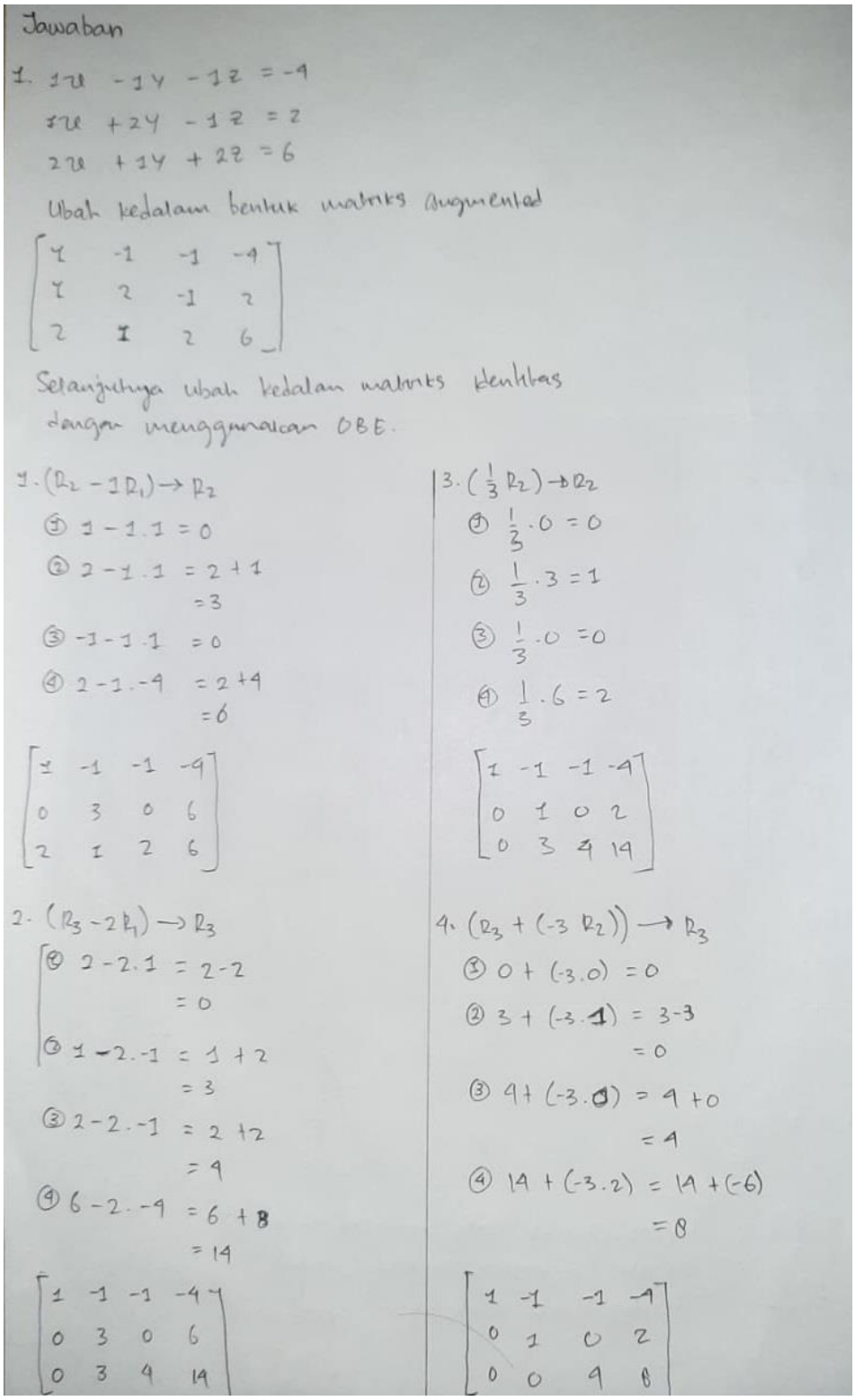
$1x - 2y + 1z = -2$

$1x + 1y + 1z = 3$

③ $2x - 1y - 1z = 3$

$2x + 2y + 2z = 6$

1. Soal E.1



Jawaban

1. $1x - 1y - 1z = -1$
   $2x + 2y - 1z = 2$
   $2x + 1y + 2z = 6$

   Ubah kedalam bentuk matriks augmented

$$\begin{bmatrix} 1 & -1 & -1 & -1 \\ 1 & 2 & -1 & 2 \\ 2 & 1 & 2 & 6 \end{bmatrix}$$

Selanjutnya ubah kedalam matriks eselon baris dengan menggunakan OBE.

1. $(R_2 - 1R_1) \rightarrow R_2$

   ① $1 - 1.1 = 0$

   ② $2 - 1.1 = 2 + 1 = 3$

   ③ $-1 - 1.1 = 0$

   ④ $2 - 1.-1 = 2 + 1 = 3$

$$\begin{bmatrix} 1 & -1 & -1 & -1 \\ 0 & 3 & 0 & 6 \\ 2 & 1 & 2 & 6 \end{bmatrix}$$

2. $(R_3 - 2R_1) \rightarrow R_3$

   ① $2 - 2.1 = 2 - 2 = 0$

   ② $1 - 2.-1 = 1 + 2 = 3$

   ③ $2 - 2.-1 = 2 + 2 = 4$

   ④ $6 - 2.-1 = 6 + 8 = 14$

$$\begin{bmatrix} 1 & -1 & -1 & -1 \\ 0 & 3 & 0 & 6 \\ 0 & 3 & 4 & 14 \end{bmatrix}$$

3. $(\frac{1}{3}R_2) \rightarrow R_2$

   ① $\frac{1}{3}.0 = 0$

   ② $\frac{1}{3}.3 = 1$

   ③ $\frac{1}{3}.0 = 0$

   ④ $\frac{1}{3}.6 = 2$

$$\begin{bmatrix} 1 & -1 & -1 & -1 \\ 0 & 1 & 0 & 2 \\ 0 & 3 & 4 & 14 \end{bmatrix}$$

4. $(R_3 + (-3R_2)) \rightarrow R_3$

   ① $0 + (-3.0) = 0$

   ② $3 + (-3.1) = 3 - 3 = 0$

   ③ $4 + (-3.0) = 4 + 0 = 4$

   ④ $14 + (-3.2) = 14 + (-6) = 8$

$$\begin{bmatrix} 1 & -1 & -1 & -1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 4 & 8 \end{bmatrix}$$

5. $(\frac{1}{4}R_3) \rightarrow R_3$

① $\frac{1}{4} \cdot 0 = 0$

② $\frac{1}{4} \cdot 0 = 0$

③ $\frac{1}{4} \cdot 4 = 1$

④ $\frac{1}{4} \cdot 8 = 2$

$$\begin{bmatrix} 1 & -1 & -1 & -4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 2 \end{bmatrix}$$

6. $(R_1 + 1R_2) \rightarrow R_1$

① $1 + 1 \cdot 0 = 1$

② $-1 + 1 \cdot 1 = 0$

③ $-1 + 1 \cdot 0 = -1$

④ $-4 + 1 \cdot 2 = -4 + 2$
$= -2$

$$\begin{bmatrix} 1 & 0 & -1 & -2 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 2 \end{bmatrix}$$

7. $(R_1 + 1R_3)$

① $1 + 1 \cdot 0 = 1$

② $0 + 1 \cdot 0 = 0$

③ $-1 + 1 \cdot 1 = -1 + 1$
$= 0$

④ $-2 + 1 \cdot 2 = -2 + 2$
$= 0$

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 2 \end{bmatrix}$$

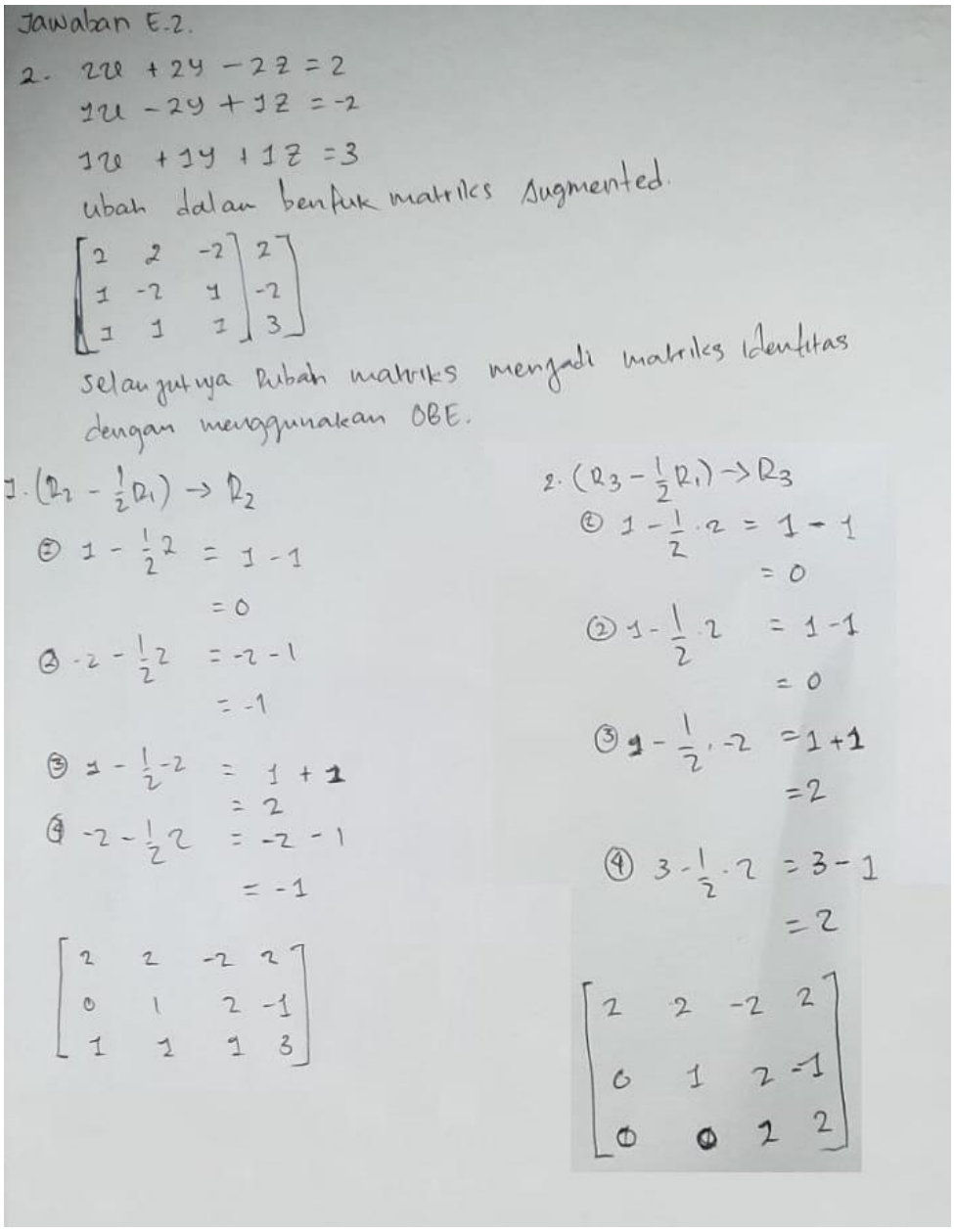
karena syarat dari matriks identitas sudah terpenuhi, maka dapat disimpulkan bahwa:

$x = 0$

$y = 2$

$z = 2$

2. Soal E.2



Jawaban E.2.

2. $2x + 2y - 2z = 2$

$1x - 2y + 1z = -2$

$1x + 1y + 1z = 3$

ubah dalam bentuk matriks Augmented.

$$\left[\begin{array}{ccc|c} 2 & 2 & -2 & 2 \\ 1 & -2 & 1 & -2 \\ 1 & 1 & 1 & 3 \end{array}\right]$$

selanjutnya Rubah matriks menjadi matriks identitas dengan menggunakan OBE.

1. $(R_2 - \frac{1}{2}R_1) \rightarrow R_2$

① $1 - \frac{1}{2}2 = 1 - 1 = 0$

② $-2 - \frac{1}{2}2 = -2 - 1 = -1$

③ $1 - \frac{1}{2}\cdot -2 = 1 + 1 = 2$

④ $-2 - \frac{1}{2}2 = -2 - 1 = -1$

$$\left[\begin{array}{cccc} 2 & 2 & -2 & 2 \\ 0 & 1 & 2 & -1 \\ 1 & 1 & 1 & 3 \end{array}\right]$$

2. $(R_3 - \frac{1}{2}R_1) \rightarrow R_3$

① $1 - \frac{1}{2}\cdot 2 = 1 - 1 = 0$

② $1 - \frac{1}{2}\cdot 2 = 1 - 1 = 0$

③ $1 - \frac{1}{2}\cdot -2 = 1 + 1 = 2$

④ $3 - \frac{1}{2}\cdot 2 = 3 - 1 = 2$

$$\left[\begin{array}{cccc} 2 & 2 & -2 & 2 \\ 0 & 1 & 2 & -1 \\ 0 & 0 & 1 & 2 \end{array}\right]$$

3. $\left(\frac{1}{2} \cdot R_3\right) \rightarrow R_3$

① $\frac{1}{2} \cdot 0 = 0$

② $\frac{1}{2} \cdot 0 = 0$

③ $\frac{1}{2} \cdot 2 = 1$

④ $\frac{1}{2} \cdot 2 = 1$

$$\begin{bmatrix} 2 & 2 & -2 & 2 \\ 0 & 1 & 2 & -1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

4. $\left(\frac{1}{2} \cdot R_2\right) \rightarrow R_2$

① $\frac{1}{2} \cdot 0 = \frac{1}{2} \cdot \frac{0}{0}$

$= \frac{0}{0}$

$= 0$

② $\frac{1}{2} \cdot 1 = \frac{1}{2} \cdot \frac{1}{2}$

$= \frac{2}{2}$

$= 1$

③ $\frac{1}{2} \cdot 2 = \frac{1}{2} \cdot \frac{2}{4}$

$= \frac{4}{4}$

$= 1$

④ $\frac{1}{2} \cdot -1 = \frac{1}{2} \cdot \frac{-1}{-2}$

$= \frac{-2}{-2}$

$= 1$

$$\begin{bmatrix} 2 & 2 & -2 & 2 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

5. $\left(R_3 - \frac{1}{1} \cdot R_2\right) \rightarrow R_2$

① $0 - \frac{1}{1} 0 = 0$

② $0 - \frac{1}{1} \cdot 1 = 0 - 1$

$= -1$

③ $1 - \frac{1}{1} \cdot 1 = 1 - 1$

$= 0$

④ $1 - \frac{1}{1} \cdot 1 = 1 - 1$

$= 0$

$$\begin{bmatrix} 2 & 2 & -2 & 2 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

6. $\left(\frac{1}{2} R_1\right) \rightarrow R_1$

① $\frac{1}{2} \cdot 2 = 1$

② $\frac{1}{2} \cdot 2 = 1$

③ $\frac{1}{2} \cdot -2 = -1$

④ $\frac{1}{2} \cdot 2 = 1$

$$\begin{bmatrix} 1 & 1 & -1 & 1 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

7. $(R_1 + 1.R_2) \rightarrow R_1$

① $1 + 1.0 = 1$

② $1 + 1.1 = 1 - 1$

$= 0$

③ $-1 + 1.0 = -1$

④ $1 + 1.0 = 1$

$$\begin{bmatrix} 1 & 0 & -1 & 1 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

8. $\left(\frac{1}{2} R_2\right) \rightarrow R_2$

① $\frac{1}{2} \cdot 0 = 0$

② $\frac{1}{2} \cdot 1 = \frac{1}{2} \cdot \frac{-1}{-2}$

$= \frac{-2}{-2}$

$= 1$

③ $\frac{1}{2} \cdot 0 = 0$

④ $\frac{1}{2} \cdot 0 = 0$

$$\begin{bmatrix} 1 & 0 & -1 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

9. $(R_1 + 1.R_3) \rightarrow R_1$

① $1 + 1.0 = 1$

② $0 + 1.0 = 0$

③ $-1 + 1.1 = -1 + 1$

$= 0$

④ $1 + 1.1 = 1 + 1$

$= 2$

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

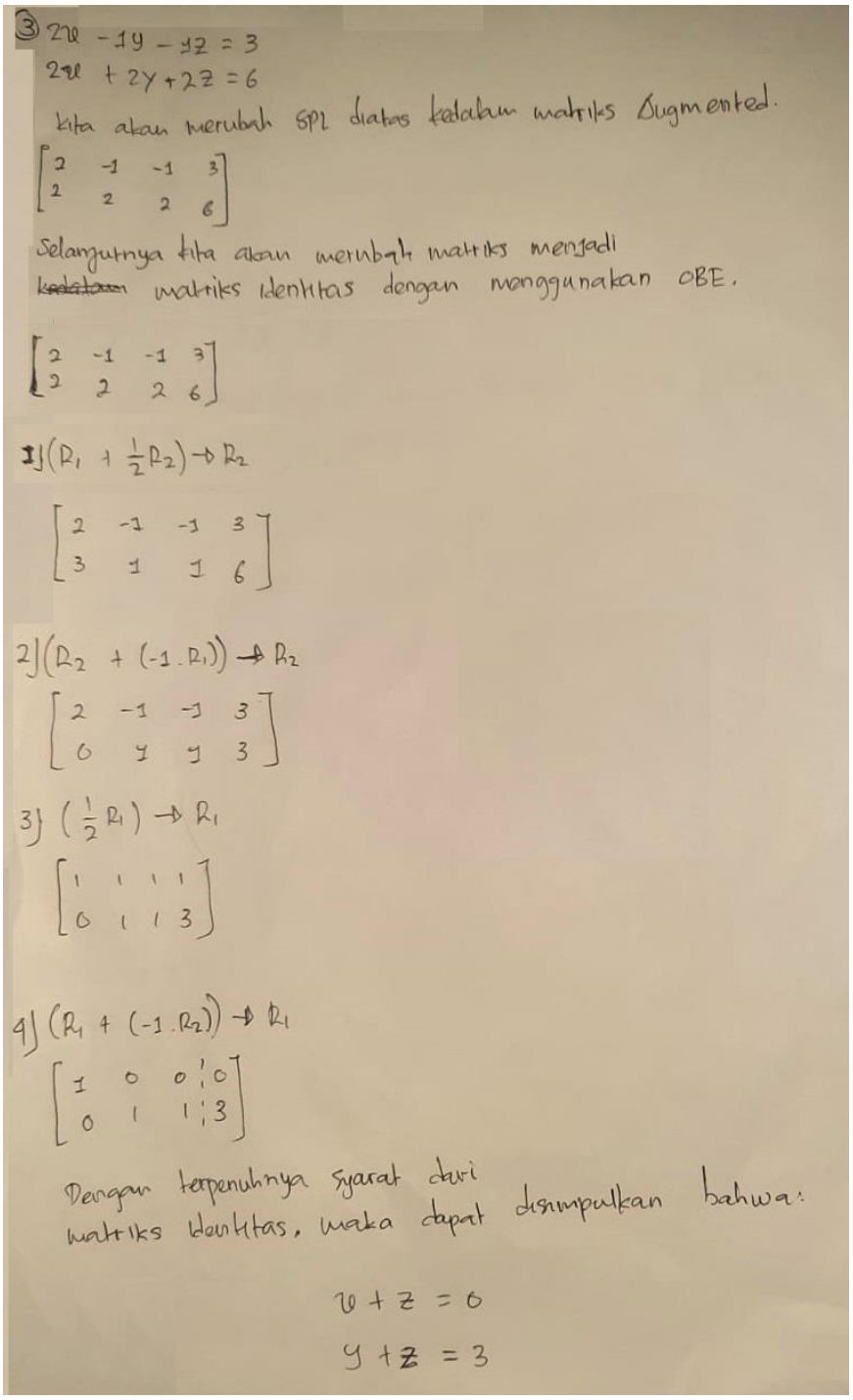
Karena syarat dari matriks identitas sudah terpenuhi, maka dapat disimpulkan bahwa:

$x = 2$

$y = 0$

$z = 1$

3. Jawaban E.3



③ $2x - 1y - 1z = 3$

$2x + 2y + 2z = 6$

Kita akan merubah SPL diatas kedalam matriks Augmented.

$$\begin{bmatrix} 2 & -1 & -1 & 3 \\ 2 & 2 & 2 & 6 \end{bmatrix}$$

Selanjutnya kita akan merubah matriks menjadi ~~kedalam~~ matriks identitas dengan menggunakan OBE.

$$\begin{bmatrix} 2 & -1 & -1 & 3 \\ 2 & 2 & 2 & 6 \end{bmatrix}$$

1) $(R_1 + \frac{1}{2}R_2) \rightarrow R_2$

$$\begin{bmatrix} 2 & -1 & -1 & 3 \\ 3 & 1 & 1 & 6 \end{bmatrix}$$

2) $(R_2 + (-1 . R_1)) \rightarrow R_2$

$$\begin{bmatrix} 2 & -1 & -1 & 3 \\ 0 & 1 & 1 & 3 \end{bmatrix}$$

3) $(\frac{1}{2}R_1) \rightarrow R_1$

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 3 \end{bmatrix}$$

4) $(R_1 + (-1 . R_2)) \rightarrow R_1$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 3 \end{array}\right]$$

Dengan terpenuhinya syarat dari matriks identitas, maka dapat disimpulkan bahwa:

$$y + z = 0$$

$$y + z = 3$$