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$$\begin{array}{rcccccl} 2x_1 & 3x_2 & x_3 & 3x_4 & 15 \\ x_1 & 2x_2 & x_3 & x_4 & 10 \\ x_1 & x_2 & x_3 & 2x_4 & 3 \end{array}$$

$$\begin{array}{rcc} x_1 & 2 & 7t \\ x_2 & 3 & 5t \\ x_3 & 2 & 4t \\ x_4 & & t \end{array}$$

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$A, B, C,$  and  $D$   $2 \times 2$

$2A \quad B^T C D \quad D^T \quad AB \quad \det C = 4 \quad \det B$

$\det B = 1$

$A = \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix} \quad \det A = 2$

$$\begin{vmatrix} 2a & d & 2b & e & 2c & f \\ & d & & e & & f \\ 4g & 3d & 4h & 3e & 4i & 3f \end{vmatrix}$$

$\det 2A^T A^{-1}$

$\det 3A^{-1}$

16

8

$\vec{u} = 2, 1, 3 \quad \vec{v} = 1, 0, 1 \quad \vec{w} = 1, 0, 1$

$\vec{u}$

$2\vec{u}$

$\vec{w}$

$2\vec{u}, 3\vec{v}$

$\vec{w}$

$\frac{2}{\sqrt{14}}, \frac{1}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

$\sqrt{3}$

$\|\vec{u}\| = 1, \|\vec{v}\| = 1 \quad \|\vec{u}\| \|\vec{u} - \vec{v}\| \quad \vec{u} - \vec{v}$

$\frac{1}{2}$

$\vec{u} = 1, 0, 1 \quad \vec{v} = 2, 1, 0 \quad Proj_{\vec{u}} \vec{v}$

1, 0, 1

$P 1,0,1 \quad A 0,1,1 \quad B 1,1,0$

3

$P$

$A$

$B$

$P, A, \text{ and } B$

$$\frac{\sqrt{3}}{\sqrt{2}}$$

$$x \quad y \quad z \quad 2$$

$A 1,2,0$

$B 0,0,1$

1

$$3x \quad 2y \quad z \quad 1$$

$$x \quad y \quad z \quad 2$$

$A 2,0,1$

1, 1,2

$$P \quad x \quad x_1 \quad 2x_2 \quad 5x_3$$

$$2x_1 \quad x_2 \quad 3x_3 \quad 20$$

$$x_1 \quad 2x_2 \quad 7x_3 \quad 50$$

$$3x_1 \quad 2x_2 \quad 5x_3 \quad 45$$

$$P \quad x \quad 45 \quad 0,35,5$$

$$C \quad x \quad 45x_1 \quad 50x_2 \quad 20x_3$$

$$2x_1 \quad x_2 \quad 3x_3 \quad 1$$

$$x_1 \quad 2x_2 \quad 2x_3 \quad 2$$

$$2x_1 \quad 7x_2 \quad x_3 \quad 5$$

$$C \quad x \quad 100 \quad 0,0,5$$