5.2.9

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Question

Solve the simultaneous linear equations $5u - 4v + 8 = 0$, $7u + 6v - 9 = 0$.

Solution

$$5u - 4v = -8 \tag{1}$$

$$7u + 6v = 9 \tag{2}$$

$$\begin{pmatrix} 5 & -4 \\ 7 & 6 \end{pmatrix} \begin{pmatrix} u \\ v \end{pmatrix} = \begin{pmatrix} -8 \\ 9 \end{pmatrix} \tag{3}$$

Augmented matrix,

$$\begin{pmatrix} 5 & -4 & -8 \\ 7 & 6 & 9 \end{pmatrix} \tag{4}$$

Solution

$$\begin{pmatrix} 5 & -4 & -8 \\ 7 & 6 & 9 \end{pmatrix} \xrightarrow{R_2 \to 5R_2 - 7R_1} \begin{pmatrix} 5 & -4 & -8 \\ 0 & 58 & 101 \end{pmatrix} \xrightarrow{R_2 \to \frac{r_2}{58}} \begin{pmatrix} 5 & -4 & -8 \\ 0 & 1 & \frac{101}{58} \end{pmatrix} \tag{5}$$

$$\begin{pmatrix} 5 & -4 & -8 \\ 0 & 1 & \frac{101}{58} \end{pmatrix} \xrightarrow{R_1 \to R_1 + 4R_2} \begin{pmatrix} 5 & 0 & -\frac{30}{29} \\ 0 & 1 & \frac{101}{58} \end{pmatrix} \xrightarrow{R_1 \to \frac{R_1}{5}} \begin{pmatrix} 1 & 0 & -\frac{6}{29} \\ 0 & 1 & \frac{101}{58} \end{pmatrix} \tag{6}$$

Solution

Thus, the solution vector is

$$\begin{pmatrix} u \\ v \end{pmatrix} = \begin{pmatrix} -\frac{6}{29} \\ \frac{101}{58} \end{pmatrix} \tag{7}$$

Python,C,Python+C codes

codes permalink

plot

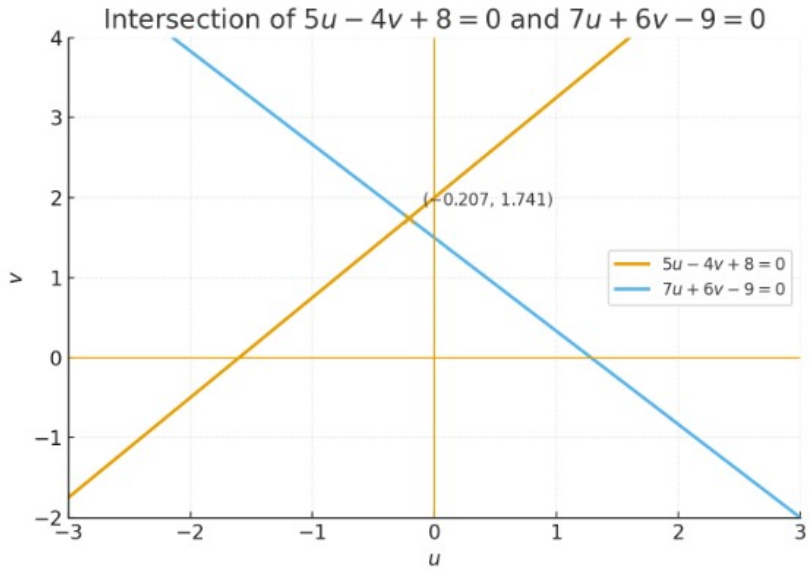

Figure: fig