Dear Student,

In this example, we have $AX = B$ but $A = LU$ therefore, $LUX = B$

Let $UX = Z$ ……….. (1)

Thus $LZ = B$ ……….(2)

where $Z = (z_1, z_2, z_3)^T$

First we have to find values of $Z = (z_1, z_2, z_3)^T$ from Eq(2)

As $LZ = B$

$$\begin{bmatrix} 5 & 0 & 0 \\ 7 & \frac{19}{5} & 0 \\ 3 & \frac{41}{5} & \frac{327}{5} \end{bmatrix} \begin{bmatrix} z_1 \\ z_2 \\ z_3 \end{bmatrix} = \begin{bmatrix} 4 \\ 8 \\ 10 \end{bmatrix}$$

From here you can find the values of $z_1 = \frac{4}{5}$, $z_2 = \frac{12}{19}$ and $z_3 = \frac{46}{327}$

Put these values of Z in Eq(1) to find the values of $X = (x_1, x_2, x_3)^T$ such that

As $UX = Z$

$$\begin{bmatrix} 1 & \frac{-2}{5} & \frac{1}{5} \\ 0 & 1 & \frac{-32}{19} \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} \frac{4}{5} \\ \frac{12}{19} \\ \frac{46}{327} \end{bmatrix}$$

By using backward substitution, we see that $x_3 = \frac{46}{327}$

you can find the values of x_1 and x_2

You can verify that $x_1 = \frac{366}{327}$, $x_2 = \frac{284}{327}$