## Gauss-Jordan

$3X_1 - 0.1X_2 - 0.2X_3 = 7.85$
$0.7X_1 + 7X_2 - 0.3X_3 = -19.3$
$0.3X_1 - 0.2X_2 + 10X_3 = 71.4$

$$\left|\begin{matrix} 3 & -0.1 & -0.2 & 7.85 \\ 0.7 & 7 & -0.3 & -19.3 \\ 0.3 & -0.2 & 10 & 71.4 \end{matrix}\right| \xrightarrow{F_1/3} \left|\begin{matrix} 1 & -0.0333 & -0.0667 & 2.6167 \\ 0.7 & 7 & -0.3 & -19.3 \\ 0.3 & -0.2 & 10 & 71.4 \end{matrix}\right| \xrightarrow[F_3-0.3F_1]{F_2-0.7F_1} \left|\begin{matrix} 1 & -0.0333 & -0.0667 & 2.6167 \\ 0 & 7.0233 & -0.2533 & -21.1317 \\ 0 & -0.19 & 10.02 & 70.695 \end{matrix}\right|$$

$$\xrightarrow{F_2/7.0233} \left|\begin{matrix} 1 & -0.0333 & -0.0667 & 2.6167 \\ 0 & 1 & -0.0361 & -3.0089 \\ 0 & -0.19 & 10.02 & 70.695 \end{matrix}\right| \xrightarrow[F_3+0.19F_2]{F_1+0.0333F_2} \left|\begin{matrix} 1 & 0 & -0.0679 & 2.5165 \\ 0 & 1 & -0.0361 & -3.0089 \\ 0 & 0 & 10.0131 & 70.0432 \end{matrix}\right|$$

$$\xrightarrow{F_3/10.0131} \left|\begin{matrix} 1 & 0 & -0.0679 & 2.5165 \\ 0 & 1 & -0.0361 & -3.0089 \\ 0 & 0 & 1 & 6.997 \end{matrix}\right| \xrightarrow[F_2+0.0361F_3]{F_1+0.0679F_3} \left|\begin{matrix} 1 & 0 & 0 & 2.9919 \\ 0 & 1 & 0 & -2.7565 \\ 0 & 0 & 1 & 6.997 \end{matrix}\right|$$

$X_1 = 2.9919$
$X_2 = -2.7565$
$X_3 = 6.997$

## Factorización LU

$$A = \left|\begin{matrix} 3 & -0.1 & -0.2 \\ 0.7 & 7 & -0.3 \\ 0.3 & -0.2 & 10 \end{matrix}\right|$$

$L_{21} = \frac{0.7}{3} = 0.2333$
$L_{31} = a_{31}/a_{11} = 0.1$

$$\xrightarrow[F_3 - L_{31}F_1]{F_2 - L_{21}F_1} \left|\begin{matrix} 3 & -0.1 & -0.2 \\ 0 & 7.0233 & -0.2533 \\ 0 & -0.19 & 10.2 \end{matrix}\right|$$

$L_{32} = \frac{a_{32}}{a_{22}} = -0.027$

$$\xrightarrow{F_3 - L_{32}F_2} \left|\begin{matrix} 3 & -0.1 & -0.2 \\ 0 & 7.0233 & -0.2533 \\ 0 & 0 & 10.0132 \end{matrix}\right| = U \qquad L = \left|\begin{matrix} 1 & 0 & 0 \\ L_{21} & 1 & 0 \\ L_{31} & L_{32} & 1 \end{matrix}\right| = \left|\begin{matrix} 1 & 0 & 0 \\ 0.233 & 1 & 0 \\ 0.1 & -0.027 & 1 \end{matrix}\right|$$

$LY = B$

$Y_1 = 7.85$

$0.233Y_1 + Y_2 = -19.3 \quad 0.233(7.85) + Y_2 = -19.3 \quad 1.82905 + Y_2 = -19.3 \quad Y_2 = -21.1317$

$0.1Y_1 - 0.026Y_2 + Y_3 = 71.4 \quad 0.1(7.85) - 0.026(-21.1317) + Y_3 = 71.4 \quad Y_3 = 70.0432$

$UX = Y$

$10.013X_3 = 70.0432 \quad \frac{70.0432}{10.0131} = 6.997 = X_3$

$7.0233X_2 - 0.2533X_3 = -21.1317 \quad 7.0233X_2 - 0.2533(6.997) = -21.1317 \quad X_2 = -2.7565$

$3X_1 - 0.1X_2 - 0.2X_3 = 7.85 \quad 3X_1 - 0.1(-2.7565) - 0.2(6.997) = 7.85 \quad X_1 = 2.9919$

## Gauss-Seidel

$X_1 = (7.85 + 0.1X_2 + 0.2X_3)/3$
$X_2 = (-19.3 - 0.7X_1 + 0.3X_3)/7$
$X_3 = (71.4 - 0.3X_1 + 0.2X_2)/10$

Valores iniciales $X_1(0) = 0, X_2(0) = 0, X_3(0) = 0$

$i = 1$
$X_1 = (7.85 + 0 + 0)/3 = 2.6167$
$X_2 = (-19.3 - 0.7(2.6167) + 0)/7 = -3.0089$
$X_3 = (71.4 - 0.3(2.6167) + 0.2(-3.0089))/10 = 7.0033$

$i = 2$
$X_1 = (7.85 + 0.1(-3.0089) + 0.2(7.0033))/3 = 2.9906$
$X_2 = (-19.3 - 0.7(2.9906) + 0.3(7.0033))/7 = -2.7997$
$X_3 = (71.4 - 0.3(2.9906) + 0.2(-2.7997))/10 = 7.0002$

$i = 3$
$X_1 = (7.85 + 0.1(-2.7997) + 0.2(7.0002))/3 = 2.9917$
$X_2 = (-19.3 - 0.7(2.9917) + 0.3(7.0002))/7 = -2.7568$
$X_3 = (71.4 - 0.3(2.9917) + 0.2(-2.7568))/10 = 6.9997$

$i = 4$
$X_1 = (7.85 + 0.1(-2.7568) + 0.2(6.9997))/3 = 2.9919$
$X_2 = (-19.3 - 0.7(2.9919) + 0.3(6.9997))/7 = -2.7565$
$X_3 = (71.4 - 0.3(2.9919) + 0.2(-2.7565))/10 = 6.9998$