

1) Calculate the following.

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & -2 \end{bmatrix} \cdot \begin{bmatrix} -3 & -1 \\ 2 & 1 \end{bmatrix} = \begin{bmatrix} -3+4 & -1+2 \\ -9+8 & -3+4 \\ -15-4 & -5-2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ -1 & 1 \\ -19 & -7 \end{bmatrix}$$

2) Suppose a system of 12 equations in echelon form has 3 free variables. How many variables are there total?

12 equations in echelon form means that there are 12 leading variables. Together with 3 free variables means that there are 15 variables total.

3) Solve the system of equations below.

$$\begin{aligned} x_1 + x_2 - 3x_3 &= 10 \\ x_2 &= 5 \\ x_3 &= 2 \end{aligned}$$

The third equation gives us that $x_3 = 2$. Then $x_2 = 5$. Lastly the first equation gives us:

$$\begin{aligned} x_1 + 5 - 6 &= 10 \\ x_1 &= 11 \end{aligned}$$

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 11 \\ 5 \\ 2 \end{bmatrix}$$