

**Source:**

Linear combination aka elimination method

$$\begin{array}{rcl} 2x + 3y & = & 5 \\ x + y & = & 1 \end{array} \quad \begin{array}{l} (1) \\ (2) \end{array}$$

is equivalent to

$$\begin{bmatrix} 2 & 3 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$$

.

We want to multiply the bottom equation by  $-2$  when solving with the elimination method normally, so we might expect to multiply by the identity matrix but with the “bottom row selector” modified:

$$\begin{bmatrix} 1 & 0 \\ 0 & -2 \end{bmatrix}.$$

$$\begin{bmatrix} 1 & 0 \\ 0 & -2 \end{bmatrix} \begin{bmatrix} 2 & 3 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$$

=

$$\begin{bmatrix} 1 & 0 \\ 0 & -2 \end{bmatrix} \begin{bmatrix} 5 \\ 1 \end{bmatrix}$$

And then, to add the bottom to the top we can use  $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ .

[\[KBe2020math530srcMatricesAsEquationsIntro\].png](#) [\[KBe2020math530floMatrixMultiplyToSolve\].png](#)