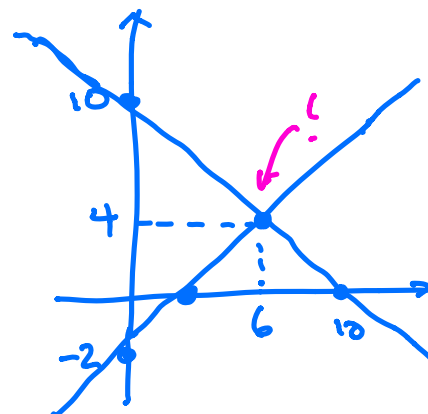


Existence and Uniqueness (2D)

* Does this system of equations have a solution? Is the solution unique?

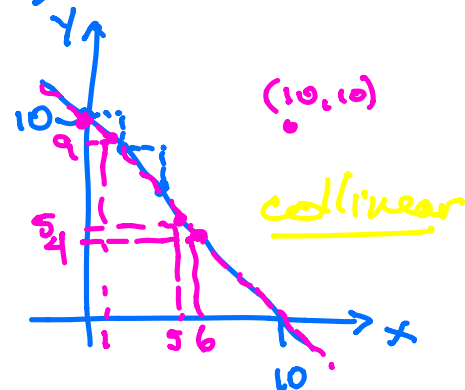
$$\begin{array}{r} x + y = 10 \\ x - y = 2 \\ \hline 2x = 12 \\ x = 6 \\ y = 4 \end{array}$$

$$\begin{array}{r} 0 + y = 10 \\ x + 0 = 10 \\ 0 - y = 2 \\ y = -2 \\ x - 0 = 2 \end{array}$$



$$\begin{array}{l} \rightarrow y = 10 - x = -x + 10 \\ \rightarrow 2x - 20 = -2y \\ 2x - 20 = -2(10 - x) \\ 2x - 20 = -20 + 2x \\ 2x - 2x = -20 + 20 \\ 0 = 0 \\ \Rightarrow \infty \text{ solutions!} \end{array}$$

$$\begin{array}{l} -2y = 2x - 20 \\ \frac{2y}{2} = \frac{-2x + 20}{2} \\ y = -x + 10 \end{array}$$



$$\begin{array}{l} x + y = 10 \\ -(-x = y - 4) \\ x = -y + 4 \\ x + 4 + y = 10 \\ 4 = 10 \\ \Rightarrow \text{no solution} \end{array}$$

$$\begin{array}{l} y - 4 = -x \\ y = -x + 4 \end{array}$$

