Partial Example

Solve the system graphically and find the coordinates of one of the corner points.

\[\begin{align*}
4x + y &\geq 2 & x \geq 0 \\
x + y &\leq 1 & y \geq 0
\end{align*}\]

**SOLUTION:**

4x + y \geq 2 means y \geq -4x + 2, and x + y \leq 1 means y \leq -x + 1. The lines y = -4x + 2 and y = -x + 1 are graphed here:

Since we also have the restriction that x \geq 0 and y \geq 0, then we only need to look at the first quadrant:

Since the inequalities say y \geq -4x + 2 and y \leq -x + 1, then the shaded area must be above (or to the right of) the steep line and below (or to the left of) the other line. The restrictions x \geq 0 and y \geq 0 mean the shaded area must remain in the first quadrant. The system is graphed here:
We will find the coordinates of the labeled corner point here

This point is the intersection of the lines \( y = -4x + 2\) and \( y = -x + 1\). So then we solve the equation \(-4x + 2 = -x + 1\). This equation tells us that \(x = \frac{1}{3}\). Plugging this in to \(y = -x + 1\) gives \(y = \frac{2}{3}\). Thus, the corner point labeled in the picture above is \(\left(\frac{1}{3}, \frac{2}{3}\right)\).