Let $f : \begin{cases} \mathbb{R}^2 \to \mathbb{R}^2 \\ (x, y) \mapsto (x + y, x + 2y) \end{cases}$. Is f injective? Surjective?

Let $((x', y'), (x, y)) \in \mathbb{R}^4 \mid f((x', y')) = f((x, y))$
$\Rightarrow x + y = x' + y'$ and $x + 2y = x' + 2y'$
$\Rightarrow x + 2y - x - y = y'$ and $x = x'$
$\Rightarrow f$ is injective

$\forall(\alpha, \beta) \in \mathbb{R}^2, \exists(x, y) = (2\alpha - \beta, \beta - \alpha) \mid x + y = \alpha$ and $x + 2y = \beta$
$\Rightarrow f$ is surjective