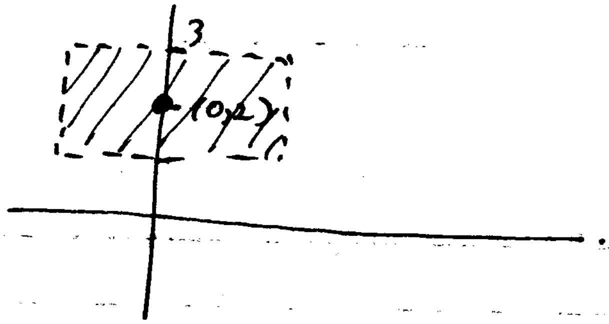
Thus $f(x,y)$ and $\frac{\partial f}{\partial y}$ are continuous on an open rectangle R containing $(0,2)$, for example
$R = \{(x,y) : -1 < x < 1,\ 1 < y < 3\}$.



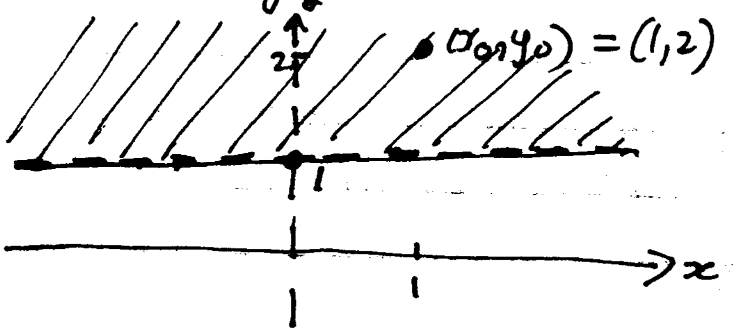
The Thm implies the IVP has a unique solution $\phi(x)$ on some open interval $-h < x < h$ containing $x=0$.

<u>Example:</u> Determine whether the IVP

$$\frac{dy}{dx} = \frac{1}{x} - \sqrt{y-1}, \qquad y(1) = 2$$

has a unique soln on some open interval containing $x=1$.

Let $f(x,y) = \frac{1}{x} - \sqrt{y-1}$.
$f(x,y)$ is continuous for (x,y) satisfying $x \neq 0$ and $y \geq 1$.



$$\frac{\partial f}{\partial y} = -\tfrac{1}{2}(y-1)^{-1/2} = \frac{-1}{2\sqrt{y-1}}$$

is continuous for (x,y) satisfying $y > 1$.

Hence $f(x,y)$ and $\frac{\partial f}{\partial y}$ are both continuous for (x,y) satisfying $x \neq 0$ and $y > 1$.