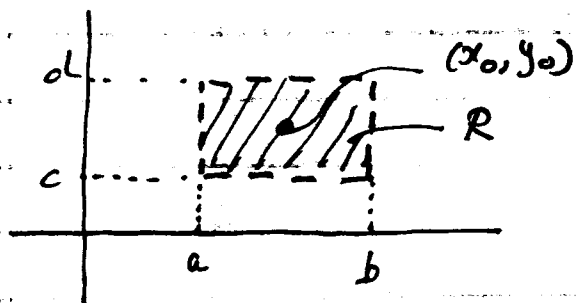


Suppose

the functions $f(x, y)$ and $\frac{\partial f}{\partial y}$ are continuous on some open rectangle R containing the point (x_0, y_0) .

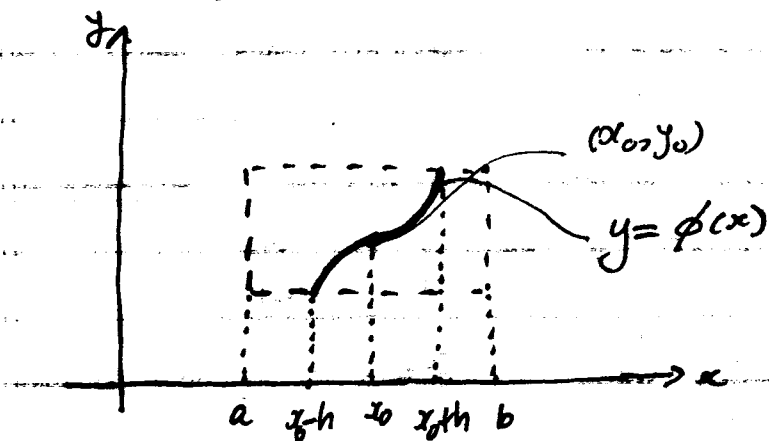
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Here

$$R = \{(x, y) : a < x < b, c < y < d\}.$$

Then the IVP (*) has a unique solution $y = \phi(x)$ on some open interval $x-h < x < x+h$ containing x_0 .



Example : Determine whether the Theorem implies the

IVP $\frac{dy}{dx} = x^2 - 5y^3, \quad y(0) = 2$

has a unique solution on some open interval containing $x=0$.

Let $f(x, y) = x^2 - 5y^3$. Then $f(x, y)$ is continuous for all (x, y) .

$\frac{\partial f}{\partial y} = -15y^2$ is continuous for all (x, y) .