## Lecture - 10th (ODF)

Picard's Steration Method (Method of Successive Approximate

$$\frac{dy}{dx} = f(x,y), \quad y(x_0) = y_0 \quad \bigcirc$$

$$\frac{dy}{dx} = f(x,y)$$

$$\Rightarrow dy = f(x,y) dx$$

$$\Rightarrow the sides from x_0 to x_1, the sides from x_0 to x_2, the sides from x_$$

$$\frac{y_{1}(x) = y_{0} + \int_{x_{0}}^{x} f(s, y_{0}(s)) ds}{y_{1}(x) = y_{0} + \int_{x_{0}}^{x} f(s, y_{1}(s)) ds}$$

$$\frac{y_{1}(x) = y_{0} + \int_{x_{0}}^{x} f(s, y_{1}(s)) ds}{y_{1}(x) = y_{0} + \int_{x_{0}}^{x} f(s, y_{1}(s)) ds}.$$

or sept of abbrevious.

This sept of approximations will converge from to the cell y(x) of y(x) of y(x) important y(x) in y(x) in y(x) in y(x) in y(x)

Example:  $\frac{dy}{dx} = -y$ , y(0) = 1.

 $\frac{dy}{dx} = f(x, y), \quad y(x_0) = y_0$ 

Here f(x,y) = -y,  $x_0 = 0$ ,  $x_0 = 1$ .

$$y_{0}(x) = y_{0} = 1.$$

$$y_{1}(x) = y_{0} + \int_{x_{0}}^{x} f(s, y_{0}(s)) ds$$

$$= 1 + \int_{0}^{x} f(s, y_{0}(s)) ds$$

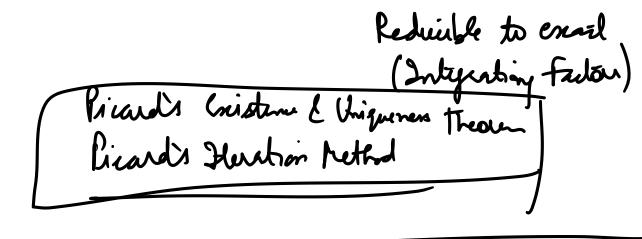
$$y_{0}(x) = 1 + \int_{0}^{x} f(s, y_{0}(s)) ds$$

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$$= 1 + \int_{0}^{x} f(s, y_{$$

Komogeneous &'s Reductle to Hom-Snad Eg's



Second Order Off.

The general form of a linear second order ODF is

$$a_0(x) \frac{dy}{dx} + a_1(x) \frac{dy}{dx} + a_2(x) y = F(x)$$

When ao(x) \$0 -

If F(x) = 0, then homogeneous If f(x) = 0, then non-hom.

# Hamogurous super Order ODE:  $\frac{dy}{dx^2} + G_1(x) \frac{dy}{dx} + g(x) y = 0$ y, y2 au sis JB, then (, y, + & y2, G,GER is also ass  $a_0(x) y_1^{11} + a_1(x) y_1' + a_2(x) y_1 = 6$   $a_0(x) y_2'' + a_1(x) y_2' + a_2(x) y_2 = 0$  $q_0(x) (c_1y_1 + g_2)^{11} + Q_1(x) (c_1y_1 + g_2)$ + 9(x)((14+44) =) a,(x) ((1y"+(y"))+a,(x) (6y,+6y) + 92(x) (Gy,+6) \$ ==  $G(adx)y'' + a_1(x)y' + a_2(x)y_1) + G(a_0(x)y''$ + a1(x)4, + 9(11) 3/ 30

= G(0) + G(0) = 0

If he know any two lonearly independent sol"s of O, then any su" of O can be written as the linear combonation of those two sits. ie y(x) = (, y, + & y, uhen 91, 92 au L-I se's y B. Finearly Independent / Finearly Dependent f's! f(x) & g(x) our said the L.I on I, if  $af(x) + bj(x) = b \forall x6I.$  $\Rightarrow a=0, b=0.$ ofhernie f(n) & g(x) will be all  $l \cdot D$ . Grafilis : f(x) = sin x,

J(n) = Short Cost)

(aga )

$$f(x) = 2 f(x)$$

$$\lim_{x \to \infty} \frac{\int f(x) - 2 f(x)}{\int f(x) - 2 f(x)} = 0$$

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$$\lim_{x \to \infty} \frac{\int f(x) - 2$$