

Pr 1

$$a) y'' - y = 0$$

$$b) y'' - ty = t$$

$$c) y' = y^2$$

Pr 2

$$y \, dy = t^2 \, dt$$

$$\int y \, dy = \int t^2 \, dt + C$$

$$\frac{1}{2} y^2 = \frac{2}{3} t^3 + C$$

$$y = \pm \sqrt{\frac{2}{3} t^3 + C}$$

$$y(0) = 1 \Rightarrow y = \sqrt{\frac{2}{3} t^3 + 1}$$

Pr 3

$$x + x \frac{dy}{dx} = 0 \quad \text{not exact.}$$

$$M = x$$

$$M_y \neq N_x$$

$$N = x$$

$$0 \neq 1$$

Pr 4

$$y' = e^t y - z t^2$$

$$y_{u+1} = y_u + f(t_u, y_u) h \quad h = 0.1$$

$$y_1 = 0 + 0.0.1 = 0$$

$$y_2 = 0 + \left[ e^{-1.0} - 0 - z - 0.01 \right] 0.1 = -0.002$$

$$y(0.1) \approx 0$$

$$y(0.2) \approx -0.002$$

ex 5

$$y = y_h + C_1 y_1 + C_2 y_2$$

$$y(0) = y_h(0) + C_1 y_1(0) + C_2 y_2(0) = 0 + C_1 \cdot 0 + C_2 \cdot 1 = 0$$

$$y'(0) = y_h'(0) + C_1 y_1'(0) + C_2 y_2'(0) = 2 + 2C_1 + C_2 \cdot 0 = 1$$

$$C_2 = 0$$

$$2 + 2C_1 = 1 \Rightarrow C_1 = -\frac{1}{2}$$

$$y = y_h - \frac{1}{2} y_1$$

Par 6

roots

-1

multiplicity 1

~~-1 ± i3~~

-1 ± i3

"

2

$$e^{-t}$$

$$e^{-t} \cos 3t$$

$$e^{-t} \sin 3t$$

$$t e^{-t} \cos 3t$$

$$t e^{-t} \sin 3t$$

Pr 7

$$(1) \quad y''' + y = t \implies y = t$$

$$(2) \quad y''' + y = \sin t$$

for (2)

$$y = A \sin t + B \cos t$$

$$y' = A \cos t - B \sin t$$

$$y'' = -A \sin t - B \cos t$$

$$y''' = -A \cos t + B \sin t$$

$$-A \cos t + B \sin t + A \sin t + B \cos t = \sin t$$

$$(A + B) = 1$$

$$A = B = \frac{1}{2}$$

$$(-A + B) = 0$$

$$g = \frac{1}{2} \sin t + \frac{1}{2} \cos t$$

solution

$$g = t + \frac{1}{2} \sin t + \frac{1}{2} \cos t$$