

1 EL<sub>e</sub> 2016      20.10.2016      10<sup>00</sup>

HAUF TEST      3.11.2016      HERO

1)BA:      RESISTORS NETWORK  
TEST      EXAMPLES

# SIMULATION LANGUAGE TKSL

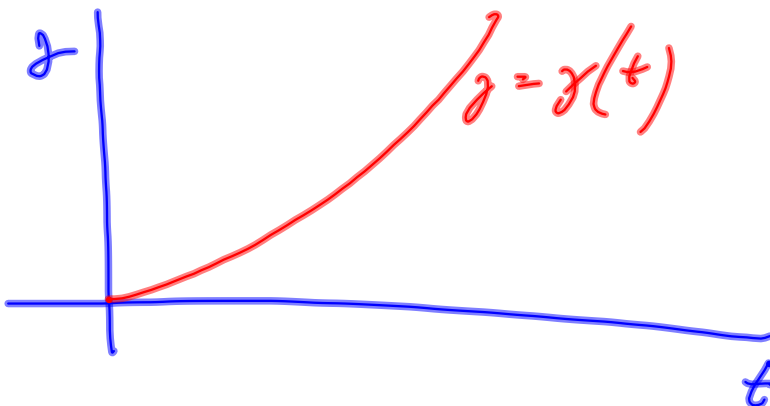
FOR SOLUTION OF DIFFERENTIAL EQUATIONS  
OF THE FIRST ORDER

$$y' - y = 1 \quad y(0) = 0$$

ANALYTIC SOLUTION EXISTS (BUT VERY COMPLICATED)

$$y' = \frac{dy}{dt} \leftarrow \text{TIME IS INDEPENDENT}$$

$\Rightarrow$  EXISTENCE SOLUTION IS FUNCTION OF TIME



$$y' - y = 1 \quad y(0) = 0$$

ANALYTIC

$$y = -1 + e^t$$

$$y' - y = 1$$

$$y' = ?$$

$$y' = 0 + e^t$$

$$e^t - (-1 + e^t) = 1$$

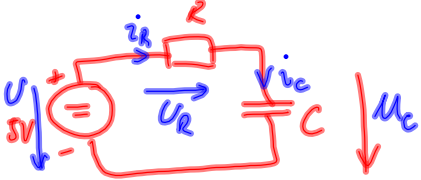
$$1 = 1$$

$$y_A = -1 + \exp(t)$$

NUMERICAL  $y' - y = 1 \quad y(0) = 0$

$$y'_N = 1 + y \quad \& \emptyset$$





$R = 10 \Omega$   
 $C = 0.1 \text{ F}$   
 $U = 5 \text{ V}$

$U_C' = ?$       AXIOM

$$U_C' = \frac{1}{C} \cdot i_C$$

II. KIRCHHOFF'S LAW

$\sum u \text{ in loop} = 0$

$U_R + U_C - U = 0$

$i_R \cdot R + U_C - 5 = 0$

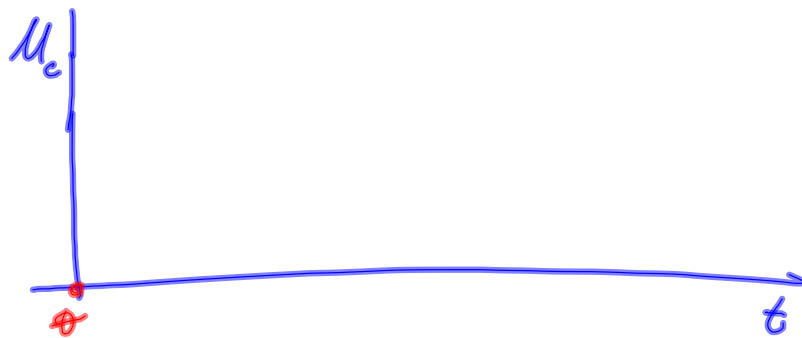
$i_R = \frac{5 - U_C}{R}$

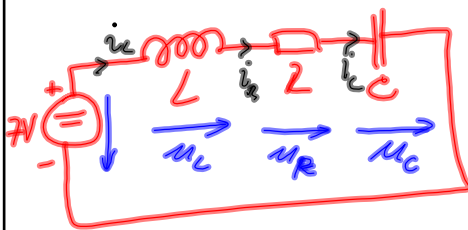
$i_R = i_C = \underline{i}$

$U_C' = \frac{1}{C} \cdot \frac{5 - U_C}{R}$

$U_C' = \frac{1}{0.1} \cdot \frac{5 - U_C}{10}$

$$U_C' = 5 - U_C \quad \& \quad \underline{0}$$





$$\mu_L(0) = 0$$

$$i_L(0) = 0$$

$$i = i_L = i_R = i_C$$

$$\mu_C' = \frac{1}{C} i_C$$

$$i_L' = \frac{1}{L} \mu_L$$

$$\textcircled{1} \mu_C' = \frac{1}{C} i \quad \& \emptyset;$$

$$\mu_L + \mu_R + \mu_C - 7 = 0$$

$$\Rightarrow \mu_C = 7 - R \cdot i - \mu_C$$

$$\textcircled{2} i' = \frac{1}{L} (7 - R \cdot i - \mu_C)$$

$$C = 1F \quad L = 1H \quad R = 1\Omega$$

$$\mu_C' = i \quad \& \emptyset$$

$$i' = 7 - i - \mu_C \quad \& \emptyset$$

$$\omega = 2\pi f$$

$$\omega = \frac{1}{\sqrt{LC}}$$

$$\omega = 1$$

$$T = \frac{1}{\omega} = 2\pi$$

