

Date: \_\_\_\_\_

Day: MTWTFSS

$$t=0, \quad t=P_0$$

$$t=5, \quad t=2P_0$$

$$i) \quad t=?, \quad P=3P_0$$

$$ii) \quad t=?, \quad P=4P_0$$

①

$$P = ce^{kt}$$

$$\boxed{P_0 = c}$$

②

$$2P_0 = ce^{5k}$$

$$2P_0 = P_0 e^{5k}$$

$$\ln 2 = 5k$$

$$k = \frac{\ln 2}{5}$$

$$\boxed{k = 0.138}$$

③

$$3P_0 = P_0 e^{0.138t}$$

$$\frac{\ln 3}{0.138} = t$$

④

$$\frac{\ln 4}{0.138} = t$$

$$t=3, \quad P=10,000$$

$$i) \quad t=0, \quad P=P_0?$$

$$ii) \quad t=10, \quad P=?$$

$$P = C e^{kt}$$

$$10,000 = C e^{3k}$$

$$\frac{\ln 10,000}{3} =$$

$$15) \quad \underbrace{L}_{\text{inductance}} \underbrace{\frac{di}{dt}}_{\text{resistance}} + Ri = \underbrace{E(t)}_{\text{voltage}}$$

$$\frac{1}{2} \frac{di}{dt} + 10i = 12$$

xply by '2'

$$\left( \frac{di}{dt} + 20i = 24 \right)$$

$\downarrow$   
 $p(x)$

$\downarrow$   
 $q(x)$

$$\int p(x) dx$$

$$\int 20i$$

$$IF = e^{\int p(x) dx} = e^{20i}$$

$$IF = e^{40i} = e^{20i}$$

xply by IF

$$\int i \cdot e^{20i} = \int e^{20i} \times 24$$

$$\frac{40i^2}{2}$$

1.



$$= i \cdot \frac{e^{20i}}{20} - \int \left( 1 \times \frac{e^{20i}}{20} \right) di$$

$$= \frac{1}{20} i e^{20i} - \frac{1}{20} \int e^{20i} di$$

$$\frac{1}{20} \left[ i e^{20i} - \frac{e^{20i}}{20} \right] = 24 \times \frac{e^{20i}}{20}$$

$$\frac{1}{20} = \frac{6 e^{20i}}{8} \times 204$$

$$i e^{20i} - \frac{e^{20i}}{20} = 24 e^{20i}$$

$$20 i e^{20i} - e^{20i} = 20 \times 24 e^{20i}$$

$$L=1, R=50, E(t)=50$$

$$\frac{di}{dt} + 50i = 50$$

$$i \cdot 20i = \frac{480 e^{20i} + e^{20i}}{20 e^{20i}}$$

$$\frac{480 e^{20i}}{20 e^{20i}} + \frac{e^{20i}}{20 e^{20i}}$$

$$i = 24 + \frac{1}{20} =$$

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$$\int d(yx)$$

yx

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$$\frac{d}{dt} (e^{20i} i) = 24e^{20i}$$

$$i e^{20i} = \frac{24}{20} e^{20i} + C$$

$$i e^{20i} = \frac{6}{5} e^{20i} + C$$

$$i = \frac{6 e^{20i}}{5 e^{20i}} + \frac{C}{e^{20i}}$$

$$i = \frac{6}{5} + C e^{-20i}$$

for  $i=0$ 

$$0 = \frac{6}{5} + C e^{-20 \times 0}$$

$$C = -\frac{6}{5}$$

$$i(t) = \frac{6}{5} - \frac{6}{5} e^{-20i}$$



$$E(t) = 30V$$

$$L = 0.1 H$$

$$R = 50 \text{ ohm}$$

$$\lim_{i \rightarrow \infty} i = 0 ?$$

$$L \frac{di}{dt} + Ri = E(t)$$

$$0.1 \frac{di}{dt} + 50i = 30$$

$$\frac{di}{dt} + \frac{50}{0.1} i = 30$$

$$\frac{di}{dt} + 500i = 30$$

$$I.F = e^{\int P(x)} = e^{\int 500 di}$$

$$= e^{500i}$$

$$i e^{500i} = \int 30 e^{500i}$$

$$i e^{500i} = \frac{30}{500} e^{500i} + C$$

$$i = \frac{30}{500} + C e^{-500i}$$

$$i = 0$$

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$$i(t) = \frac{30}{500} - \frac{30}{500} e^{-500t}$$

$$i(\infty) = \frac{3}{5}$$

For  $t = 0$

$$= \frac{3}{5} - e^{-\infty}$$

$$i(t) = \frac{3}{5}$$