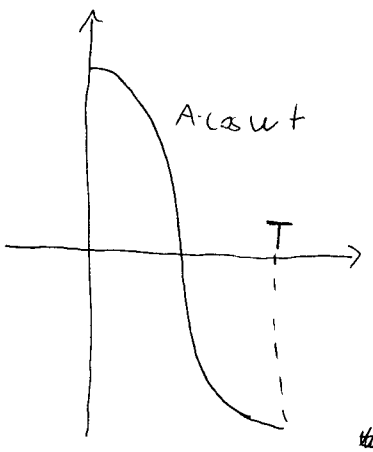
(1.)



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

$$\mathcal{L}\{[\varepsilon(t) - \varepsilon(t-T)] \cdot A \cdot \cos\omega t\} =$$

$$= \mathcal{L}\{\varepsilon(t) \cdot A \cdot \cos\omega t\} - \mathcal{L}\{\varepsilon(t-T) \cdot A \cdot \cos\omega t\} =$$

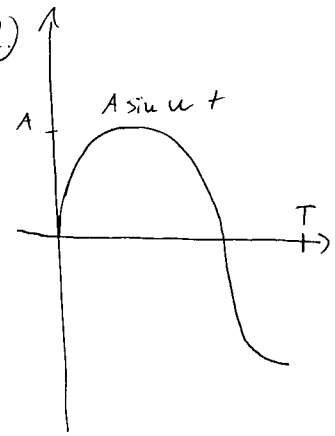
$$\cos\omega t = \cos\omega((t-T)+T) = \cos\omega(t-T)\cdot\cos\omega T + \sin\omega(t-T)\sin\omega T =$$

$$= \cos\omega(t-T)\cdot\underbrace{\cos\frac{\pi}{T}T}_{\cos\pi=-1} + \sin\omega(t-T)\cdot\underbrace{\sin\frac{\pi}{T}T}_{0} = -1\cdot\cos\omega(t-T)$$

$$= \mathcal{L}\{\varepsilon(t)\cdot A\cdot\cos\omega t\} + \mathcal{L}\{\varepsilon(t-T)\cdot A\cdot\cos\omega(t-T)\} = \frac{As}{s^2+\omega^2} + \frac{As}{s^2+\omega^2}\cdot e^{-sT} =$$

$$= \frac{As(1+e^{-sT})}{s^2+\omega^2}$$

(2)



$$\mathcal{L}\{[\varepsilon(t)-\varepsilon(t-T)]\cdot A\cdot\sin\omega t\}=\mathcal{L}\{\varepsilon(t)\cdot A\sin\omega t\}-\mathcal{L}\{\varepsilon(t-T)\cdot A\sin\omega t\}=$$

$$\sin\omega t=\sin(\omega(t-T)+\omega T)=\sin\omega(t-T)\cos\omega T+\cos\omega(t-T)\cdot\sin\omega T=$$

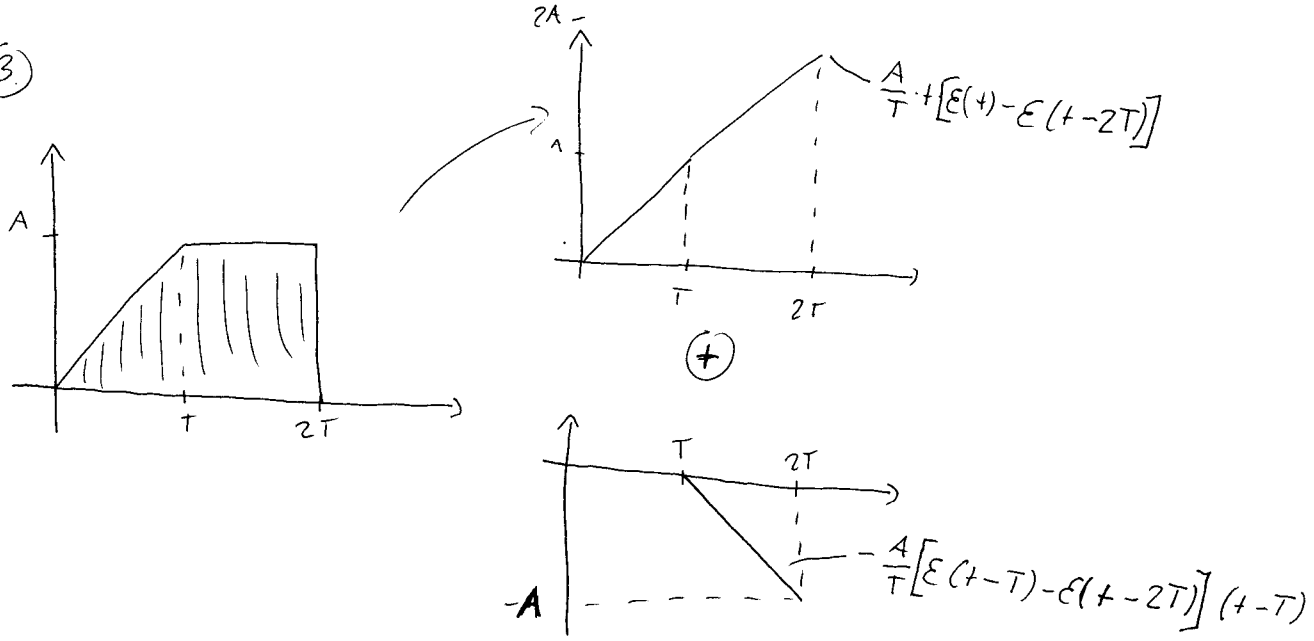
$$=\sin\omega(t-T)\cdot\underbrace{\cos\tfrac{3}{2}\tfrac{\pi}{T}\cdot T}_{\cos\frac{3}{2}\pi=0}+\cos\omega(t-T)\cdot\underbrace{\sin\tfrac{3}{2}\tfrac{\pi}{T}T}_{\sin\frac{3}{2}\pi=-1}=-\cos\omega(t-T)$$

$$\omega=\frac{2\pi}{\frac{4}{3}T}=\frac{6}{4}\frac{\pi}{T}=\frac{3}{2}\frac{\pi}{T}$$

$$=\mathcal{L}\{\varepsilon(t)\cdot A\cdot\sin\omega t\}+\mathcal{L}\{\varepsilon(t-T)\cdot A\cdot\cos\omega(t-T)\}=$$

$$=\frac{A\omega}{s^2+\omega^2}+\frac{A\cdot s}{s^2+\omega^2}\cdot e^{-sT}=\frac{A(\omega+s\,e^{-sT})}{s^2+\omega^2}$$

(3.)



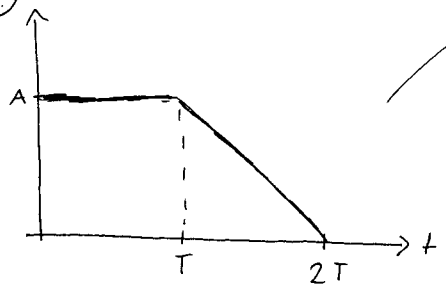
$$\mathcal{L}\left\{\frac{A}{T} \cdot [\varepsilon(t) - \varepsilon(t-2T)] - \frac{A}{T}(t-T)[\varepsilon(t-T) - \varepsilon(t-2T)]\right\} =$$

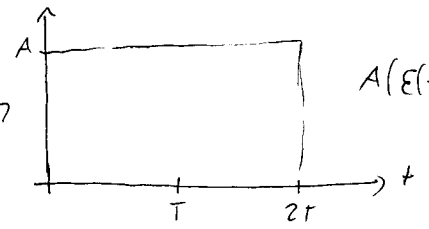
$$= \mathcal{L}\left\{\frac{A}{T} t \cdot \varepsilon(t) - \cancel{\frac{A}{T} t \varepsilon(t-2T)} - \frac{A}{T}(t-T)\varepsilon(t-T) + \cancel{\frac{A}{T} \varepsilon(t-2T)} + \frac{A}{T} T \varepsilon(t-2T)\right\} =$$

$$= \frac{A}{T} \cdot \frac{1}{s^2} - \frac{A}{T} \cdot \frac{1}{s^2} \cdot e^{-sT} + \mathcal{L}\{A\varepsilon(t-2T)\} = \frac{A}{T} \cdot \frac{1}{s^2} - \frac{A}{T} \cdot \frac{1}{s^2} \cdot e^{-sT} + \frac{1}{s} \cdot e^{-2sT} =$$

$$= \underline{\underline{\frac{1}{s}\left(\frac{A}{Ts} - \frac{A e^{-sT}}{Ts} + e^{-2sT}\right)}}$$

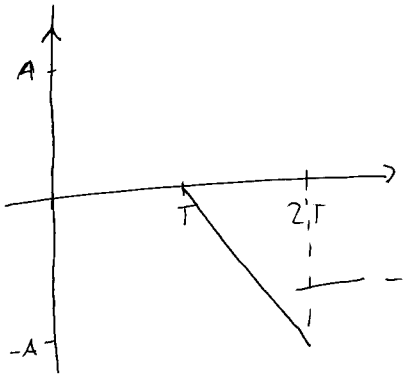
④





$A(\varepsilon(t) - \varepsilon(t-2T))$

+



$-\frac{A}{T}(t-T)[\varepsilon(t-T) - \varepsilon(t-2T)]$

$$\mathcal{L}\left\{A[\varepsilon(t) - \varepsilon(t-2T)] - \frac{A}{T}(t-T)[\varepsilon(t-T) - \varepsilon(t-2T)]\right\} =$$

$$= \mathcal{L}\{A\cdot\varepsilon(t)\} - \mathcal{L}\{A\cdot\varepsilon(t-2T)\} - \mathcal{L}\left\{\frac{A}{T}(t-T)\varepsilon(t-T)\right\} + \mathcal{L}\left\{\frac{A}{T}(t-T)\varepsilon(t-2T)\right\} =$$

$$= \frac{A}{s} - \frac{A}{T}\frac{1}{s^2}\cdot e^{-sT} - \cancel{\mathcal{L}\{A\cdot\varepsilon(t-2T)\}} + \underbrace{\mathcal{L}\left\{\frac{A}{T}(t-2T+T)\varepsilon(t-2T)\right\}}_{} =$$

$$\mathcal{L}\left\{\frac{A}{T}(t-2T)\varepsilon(t-2T)\right\} + \cancel{\mathcal{L}\left\{\frac{A}{T}T\,\varepsilon(t-2T)\right\}}$$

$$= \frac{A}{s} - \frac{A}{T}\frac{1}{s^2}\cdot e^{-sT} + \frac{A}{T}\frac{1}{s^2}e^{-2sT} = \underline{\underline{\frac{A}{s}\left(1 - \frac{e^{-sT}}{Ts} + \frac{e^{-2sT}}{Ts}\right)}}$$