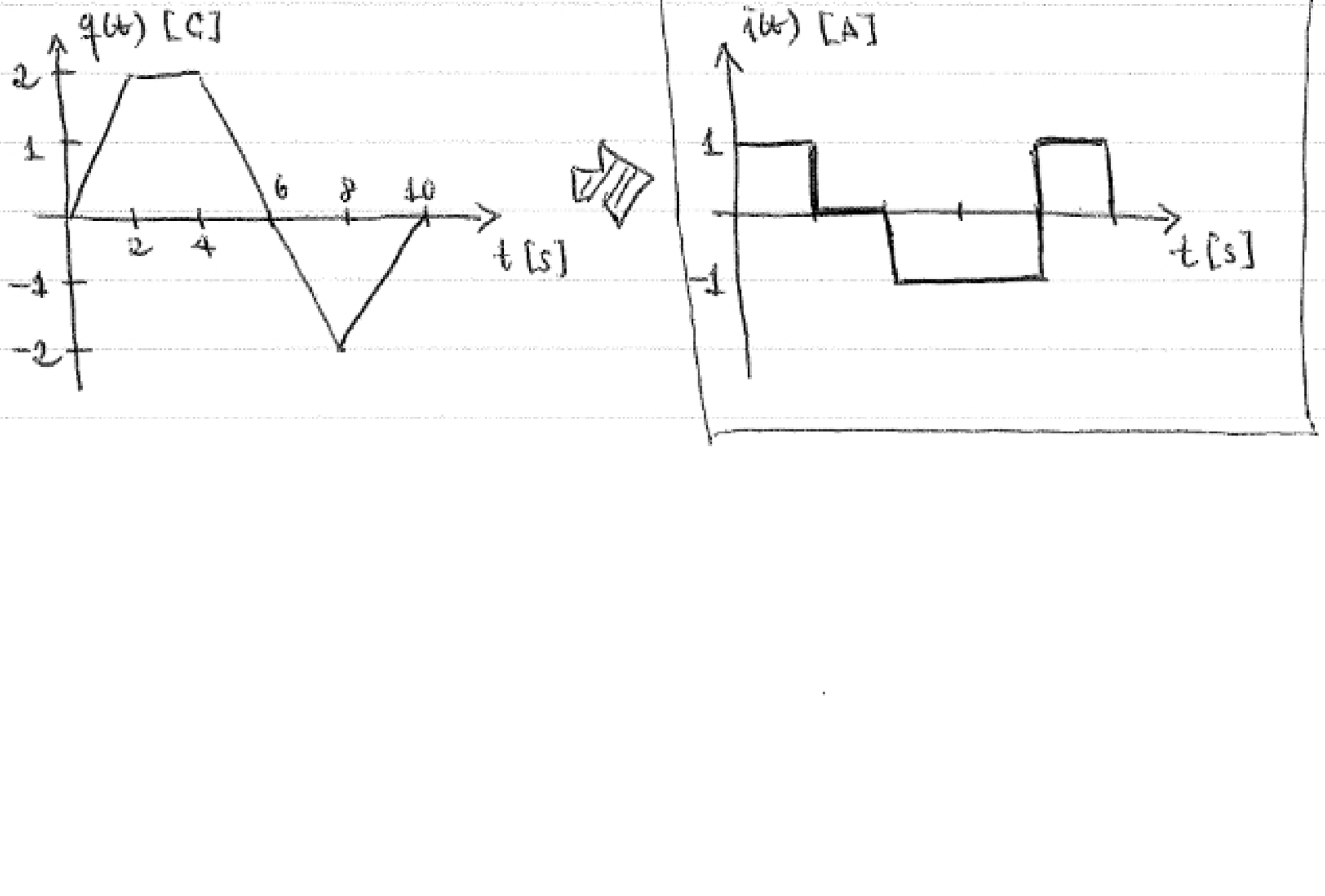
4(a) $q(t) = e^{-1} \sin(120\pi t)$ [C] for $t \geq 0$

$$i(t) = \frac{dq}{dt} = \boxed{120\pi e^{-1} \cos(120\pi t) \text{ [A]}, \quad t \geq 0}$$

(b)



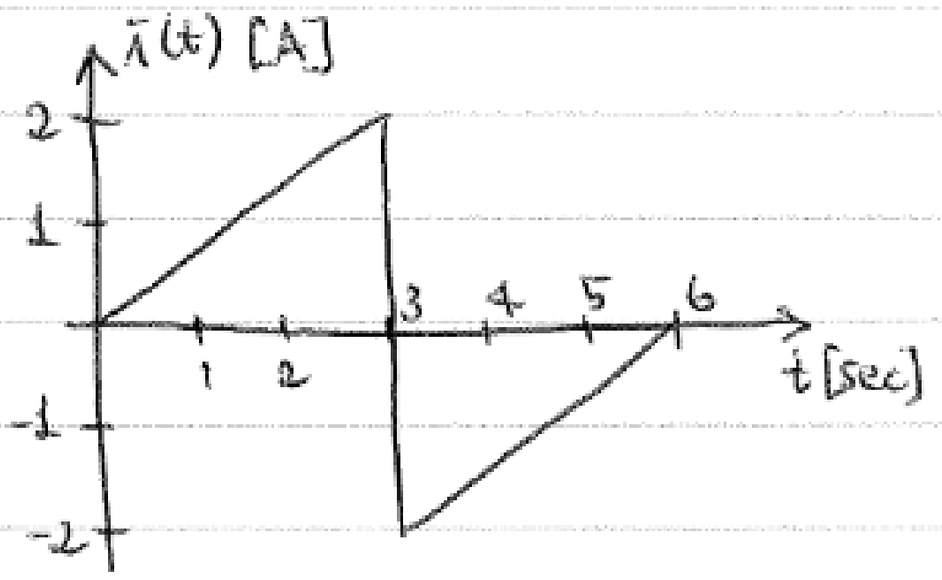
7) (a) $i(t) = 2 - e^{-2t} - \cos(2t)$

$$\Rightarrow q(t) = \int_0^t i(t)\,dt = \int_0^t \left\{2 - e^{-2t} - \cos(2t)\right\} dt$$

$$= \left| 2t + \frac{e^{-2t}}{2} - \frac{\sin(2t)}{2} \right|_0^t$$

$$= \left(2t + \frac{e^{-2t}}{2} - \frac{\sin(2t)}{2} - \frac{1}{2} \right) C$$

7(c)



$$i(t) = \begin{cases} \frac{2}{3}t & \text{for } 0 \le t < 3 \\ \frac{2}{3}t - 4 & \text{for } 3 \le t < 6 \end{cases}$$

$$q(t) = \int i(t)\, dt$$

For $0 < t < 3$: $\quad q(t) = \int_0^t \frac{2}{3}\tau \, d\tau = \boxed{\frac{t^2}{3} \quad [C]}$

For $3 < t < 6$: $\quad q(t) = \int_0^3 \frac{2}{3}\tau \, d\tau + \int_3^t \left(\frac{2}{3}\tau - 4\right) d\tau$

$$= 3 + \frac{t^2}{3} - 4t + 9 = \boxed{\frac{t^2}{3} - 4t + 12 \quad [C]}$$