1. Find the derivatives of the following functions:

   a. $v(t) = 2t^2 + 8t + 9$

   b. $i(t) = \frac{2}{3}e^{-2t}$

   c. $q(t) = 2k\cos(12t)$

   d. $v(t) = 3e^{-2t}\cos(6t + \frac{\pi}{4})$

2. Find the integrals of the following functions:

   a. $v(t) = \int_0^2 6\,dt$

   b. $q(t) = \int_0^t 9\tau^2 + \tau\,d\tau$

   c. $i(t) = \int_{-\infty}^2 3e^{4t}\,dt$

   d. $\omega(t) = \int_t^\infty p(\tau)\,d\tau$ if $p(t) = e^{-2t}$

   e. $\omega(t) = \int_{-\infty}^t p(\tau)\,d\tau$ if $p(t) = t$ for $t \geq 0$ and $\omega(0) = 2$. Only solve for $t \geq 0$.

   f. $q(t) = \int_0^{\pi/4} 3\cos(2t)\,dt$

3. Find $q(t) = \int_{-\infty}^t i(\tau)d\tau$ for $t \geq 0$ if $q(0) = 2$ and $i(t)$ =