Problem 2.6  Compute the response $y(t)$ of an initially uncharged RC circuit to a pulse $x(t)$ of duration $\varepsilon$, height $\frac{1}{\varepsilon}$, and area $\varepsilon \frac{1}{\varepsilon} = 1$;

\[ x(t) = \frac{1}{\varepsilon} (u(t) - u(t - \varepsilon)) \]

\[ y(t) = \frac{1}{\varepsilon} (y_{\text{step}}(t) - y_{\text{step}}(t - \varepsilon)) \]

\[ = \frac{1}{\varepsilon} \left( -e^{-t/(RC)} + e^{-(t-\varepsilon)/(RC)} \right) \]

\[ = \frac{1}{\varepsilon} \left( e^{\varepsilon/(RC)} - 1 \right) e^{-t/(RC)} \]

\[ \approx \frac{1}{\varepsilon} \frac{\varepsilon}{RC} e^{-t/(RC)} = \frac{1}{RC} e^{-t/(RC)}. \]

The power series for $e^{at}$ truncated to two terms is $e^{at} \approx 1 + ax$, and valid for $ax \ll 1$. Set $a = \frac{\varepsilon}{RC}$ and substitute the result in your answer. Show that $y(t)$ simplifies to Eq. (2.17).