Due September 15, 2011

1. Find the Laplace transform of $\delta(t) + e^{-t}$.
2. Find the limit of $\delta(t) + e^{-t}$ with $t \to \infty$ by using the final value theorem.
3. Find the Laplace transform of $e^{-t} + e^{-3t}$.
4. Find the limit of $e^{-t} + e^{-3t}$ with $t \to \infty$ by using the final value theorem.
5. Consider a dynamic system whose equation of motion is:
   \[ \frac{d^2x(t)}{dt^2} + 3 \frac{dx(t)}{dt} + 2x = 0. \]
   The initial conditions are: $x(0) = a$ and $\dot{x}(0) = b$.

Find the limit of $x(t)$ with $t \to \infty$, without solving the above differential equation.

Write the final answers to each question below. Submit this page with the rest of your solution.

1.
2.
3.
4.
5.