

3. [14 points] Find each of the following, as indicated.
- a. [7 points] If a function $f(t)$ has the Laplace transform $F(s) = \mathcal{L}\{f(t)\}$, use the integral definition of the Laplace transform to find the transform $\mathcal{L}\{\int_0^t f(x) dx\}$ in terms of $F(s)$.
(You may assume that $\int_0^\infty f(x) dx = L$, a finite value.)
- b. [7 points] Find an explicit expression for $Y = \mathcal{L}\{y\}$ if $y''' + 3y = t^2e^{-4t} - e^{-2t} \cos(5t)$.
(Note that you are not asked to solve the differential equation.)