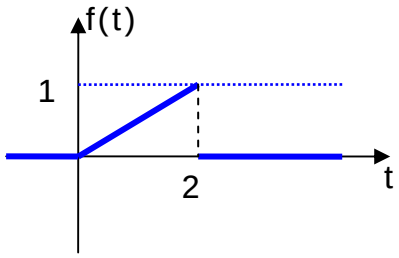
Problem S3.3

Obtain the Laplace transform of the function shown below.



Solution:

$$f = \begin{cases} 0.5t & 0 \le t < 2 \\ 0 & otherwise \end{cases}$$

$$F(s) = \int_0^2 0.5te^{-st}dt$$

Using integration by parts,

$$u = t,\ dv = e^{-st}dt \Rightarrow du = dt,\quad v = -\frac{e^{-st}}{s}$$

$$F(s) = 0.5\left(-\frac{e^{-st}}{s}\, t \Big|_0^2 + \int_0^2 -\frac{e^{-st}}{s}dt \right) = \frac{0.5}{s^2}(1 - e^{-2s}) - \frac{1}{s}e^{-2s}$$