

Problem S3.1

Obtain the Laplace transform of $f = \begin{cases} 1-2t & 0 \leq t < 2 \\ 0 & 2 \leq t < 3 \\ 1 & 3 \leq t \end{cases}$

Solution:

$$F(s) = \int_0^2 (1-2t)e^{-st} dt + \int_2^3 0 dt + \int_3^{\infty} e^{-st} dt = \frac{(e^{-2s} - 1)}{s} - \frac{2(e^{-2s} - 1)}{s^2} + \frac{e^{-3s}}{s}$$