MAP 2302 Nov 4, 2014

Correction to an example from class today

Example (similar to Ch.9.1, ex.5) Compute the Laplace transform of

$$f(t) = \begin{cases} \text{t} & \text{if } 0 < t < 3 \\ 4 & \text{if } t \geq 3 \end{cases}$$

Solution: $L(f) = \int_0^3 e^{-st} t \; dt + \int_3^\infty e^{-st} 4 \; dt = A + B$, where we compute A using I.B.P.:

$A = \frac{e^{-st}t}{-s}|_0^3 + \int_0^3 \frac{e^{-st}}{s} \; dt = \frac{-3e^{-3s}}{s} - \frac{e^{-st}}{s^2}|_0^3 = \frac{-3e^{-3s}}{s} - \frac{e^{-3s}-1}{s^2}$ and

$B = 4\frac{e^{-st}}{-s}|_3^\infty = 4\frac{e^{-3s}}{s}$ for $s > 0$ (taking a naughty shortcut with the improper integral).

So, the answer is $\frac{e^{-3s}}{s} + \frac{1-e^{-3s}}{s^2}$, for $s > 0$.

In class, I had s instead of s^2 in the denominator, probably from some earlier mistake, or miscopying.