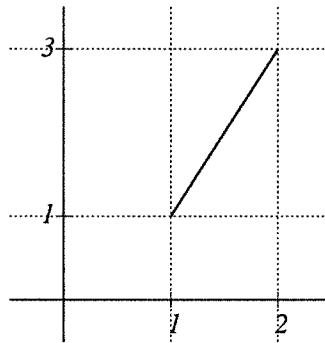


1. A graph of  $y = f(t)$  is given below.



$$f = \begin{cases} 2t - 1 & 1 < t < 2 \\ 0 & \text{otherwise} \end{cases}$$

(a) 2 Express  $f(t)$  using unit step functions.

$$f(t) = u(t-1) [2t-1] - u(t-2) [2t-1]$$

(b) 2 Find the Laplace transform of  $f(t)$ .

$$\begin{aligned} F(s) &= e^{-s} \int \{ 2(t+1) - 1 \} - e^{-2s} \int \{ 2(t+2) - 1 \} \\ &= e^{-s} \left( \frac{2}{s^2} + \frac{1}{s} \right) - e^{-2s} \left( \frac{2}{s^2} + \frac{3}{s} \right) \end{aligned}$$

2. 6 Find the inverse Laplace transform of

$$F(s) = e^{-3(s+1)} \frac{s-2-s^2}{(s^2)(s-2)}$$

$$\frac{s-2-s^2}{s^2(s-2)} = \frac{s-2}{s^2(s-2)} - \frac{s^2}{s^2(s-2)} = \frac{1}{s^2} - \frac{1}{s-2}$$

$$f(t) = e^{-3} u(t-3) \left[ (t-3) - e^{2(t-3)} \right]$$