Ex: Using algebraic simplification and a table of Laplace transform pairs, find the Laplace transform of each of the following functions:

a) $f(t) = 3e^{-(t-1)}$

b) $f(t) = \cos(2\pi t + 30°)$

c) $f(t) = 4 + t$

SOL'N: a)

$$f(t) = 3e^{-(t-1)} = 3e \cdot e^{-t}$$

$$\mathcal{L}\{3e \cdot e^{-t}\} = 3e\mathcal{L}\{e^{-t}\} = \frac{3e}{s+1}$$

SOL'N: b)

$$f(t) = \cos(2\pi t + 30°) = \cos(2\pi t)\cos(30°) - \sin(2\pi t)\sin(30°)$$

$$\mathcal{L}\{\cos(2\pi t)\cos(30°) - \sin(2\pi t)\sin(30°)\}$$
$$= \cos(30°)\mathcal{L}\{\cos(2\pi t)\} - \sin(30°)\mathcal{L}\{\sin(2\pi t)\}$$
$$= \frac{\sqrt{3}}{2}\frac{s}{s^2 + (2\pi)^2} - \frac{1}{2}\frac{2\pi}{s^2 + (2\pi)^2}$$

SOL'N: c)

$$\mathcal{L}\{4 + t\} = 4\mathcal{L}\{u(t)\} + \mathcal{L}\{t\} = \frac{4}{s} + \frac{1}{s^2}$$