

DE2 Electronics 2

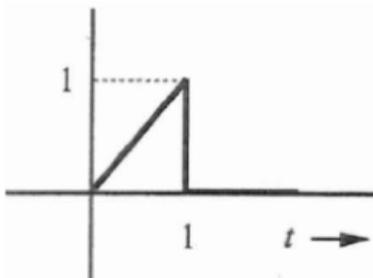
Tutorial Sheet 3 – Laplace Transform and Transfer Functions (Lectures 6 - 7)

* indicates level of difficulty

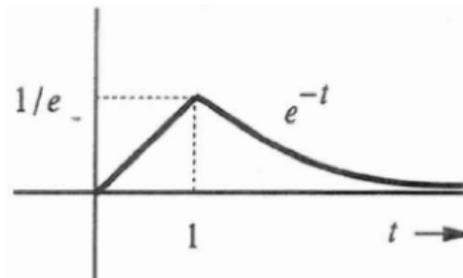
1.* By direct integration or table look up, find the one-sided Laplace transforms of the following functions:

- a) $u(t) - u(t-1)$
- b) $te^{-t}u(t)$
- c) $t \cos \omega_0 t u(t)$

2.* By direct integration or otherwise, find the Laplace transforms of the following signals:



(a)



(b)

3.* Find the inverse (one-sided) Laplace transforms of the following functions:

- a) $\frac{2s+5}{s^2+5s+6}$
- b) $\frac{(s+1)^2}{s^2-s-6}$

4.** Find the Laplace transforms of the following function using the Laplace Transform Table and the time-shifting property where appropriate.

- a) $u(t) - u(t-1)$
- b) $e^{-(t-\tau)}u(t)$
- c) $\sin[\omega_0(t-\tau)]u(t-\tau)$

5.** For each of the system described by the following differential equations, find the system transfer function.

- a) $\frac{d^2y}{dt^2} + 11\frac{dy}{dt} + 24y(t) = 5\frac{df}{dt} + 3f(t)$
- b) $\frac{d^3y}{dt^3} + 6\frac{d^2y}{dt^2} - 11\frac{dy}{dt} + 6y(t) = 3\frac{d^2f}{dt^2} + 7\frac{df}{dt} + 5f(t)$