

2001 PAPER IV Q6

(ADAPTED)

- (a) Write down the Convolution Integral and briefly explain what it does and why it works.
- (b) A linear system has an impulse response $g(t)$. Show that the unit step response of such a system is given by

$$y(t) = \int_0^t g(\tau) d\tau$$

(c) A finite duration integrator can be modelled by the impulse response given by:

$$g(t) = H(t) - H(t-a)$$

Where $H(t)$ corresponds to a step function.

(i) If the input to this system is given by

$$x(t) = A \exp(-bt) H(t)$$

find an expression for the output of the system.

(ii) Demonstrate graphically that the result you obtain makes physical sense.