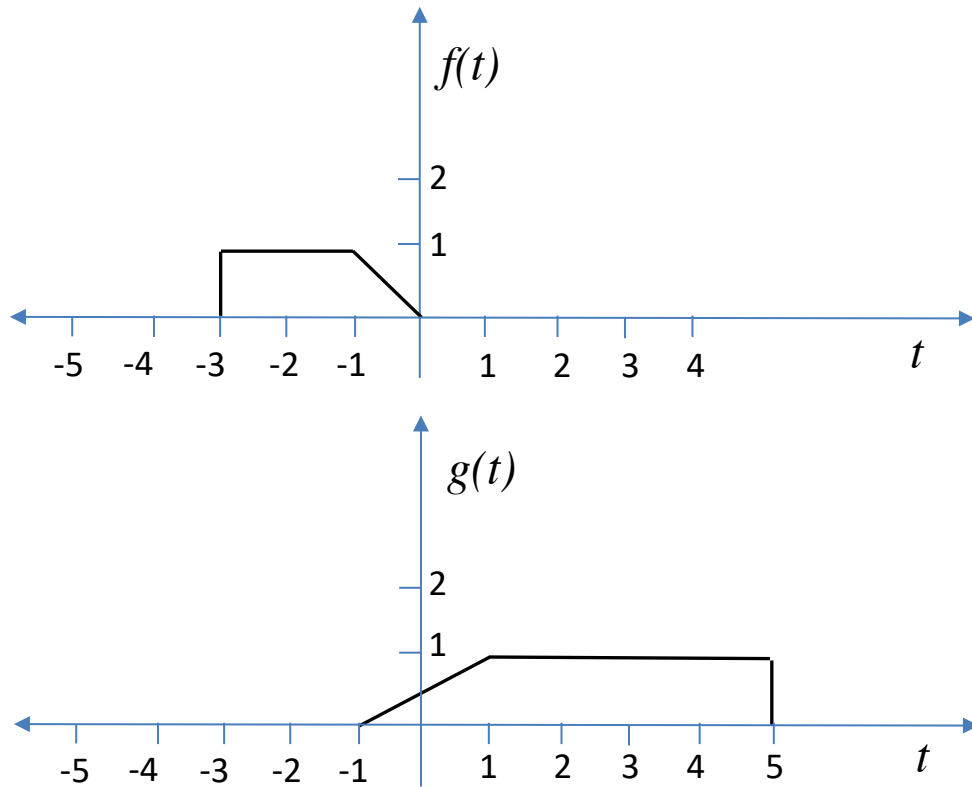
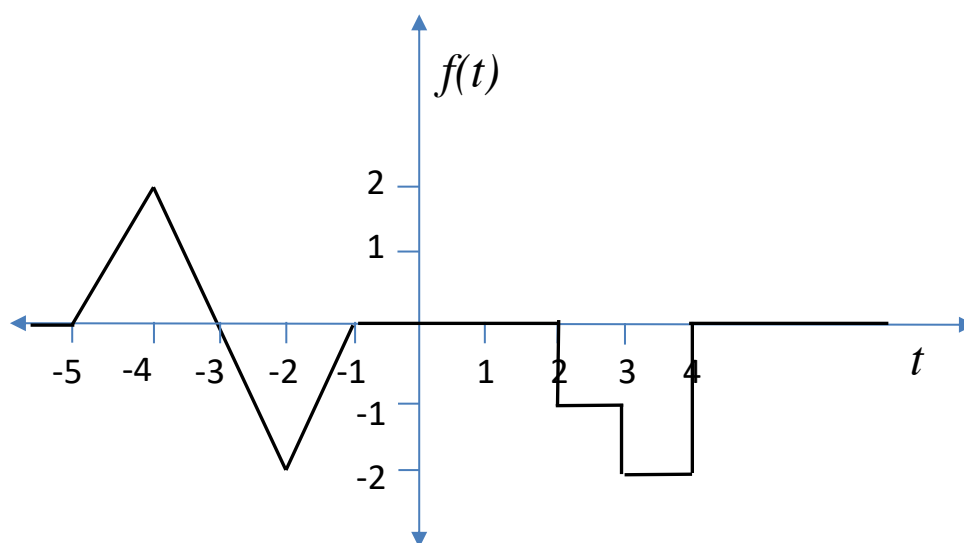


## ELEC2040 Signals and systems – Practice for Test 1

**Q1** Given  $f(t)$ , depicted in the first figure below, find a formula for  $g(t)$  in terms of  $f(t)$ , where  $g(t)$  is depicted in the second figure below. Show your working.



**Q2** For the function  $f(t)$  in the following graph:



- (a) Compute the average value of the signal  $f(t)$  over the interval  $[-5,4]$ .
- (b) Compute the average value of the signal  $f(t)$  over the interval  $[-3,3]$ .
- (c) Compute the energy in the signal  $f(t)$  over the interval  $[-5,4]$ .
- (d) Compute the average power of the signal  $f(t)$  over the time interval  $[-5,4]$ .
- (e) Plot  $f(2t+1)$

**Q3.** Consider the linear system given by the input-output relations:

$$y(t) = 2x(t-3) + 0.5x(t-5)$$

- (a) Write down the impulse response  $h(t)$  and draw it
- (b) Write down the output of the system,  $y(t)$ , when the input signal is  $x(t) = \delta(t-\tau)$  and draw  $y(t)$ .
- (c) Is the system time invariant? Explain.

**Q4** Evaluate the following integrals:

a)  $\int_{-\infty}^{\infty} \sin(t) \delta(t - \pi / 6) dt$

b)  $\int_{-\infty}^{\infty} u(t+2) \delta(t-1) dt$

c)  $\int_{-\infty}^{\infty} (t+1) (\delta(t-1) + 2\delta(t-3)) dt$

d)  $\int_{-\infty}^{\infty} \exp(jt) \delta(t - \pi) dt$