Solutions to EE3210 Quiz 2 Problems

Problem 1:

(a) The signal $x(t) = \cos(2t)$ is periodic and its fundamental period is $T_0 = 2\pi/\omega = 2\pi/2 = \pi$.

(b) The signal $x(t) = \sin(2\pi t)$ is periodic and its fundamental period is $T_0 = 2\pi/\omega = 2\pi/(2\pi) = 1$.

(c) To determine whether or not the signal $x(t) = \cos(2t) + \sin(2\pi t)$ is periodic, it reduces to find if there exist two integers m and k such that

$$m \cdot \pi = k \cdot 1. \tag{1}$$

Since π is not a rational number, (1) does not hold. Therefore, $x(t)$ is not a periodic signal.

Problem 2: Since $e[n] = x[n] - y[n]$, we have

$$y[n] = e[n-1] = x[n-1] - y[n-1].$$

Given $x[n] = u[n]$ and $y[n] = 0$ for $n < 0$, the output $y[n]$ is sketched in the figure below.