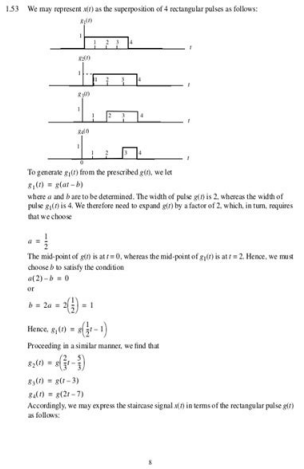

1.53 We may represent $x(t)$ as the superposition of 4 rectangular pulses as follows:

$g_1(t)$ $g_2(t)$ $g_3(t)$ $g_4(t)$

To generate $g_1(t)$ from the prescribed $g(t)$, we let

$$g_1(t) = g(at - b)$$

where a and b are to be determined. The width of pulse $g(t)$ is 2, whereas the width of pulse $g_1(t)$ is 4. We therefore need to expand $g(t)$ by a factor of 2, which, in turn, requires that we choose

$$a = \frac{1}{2}$$

The mid-point of $g(t)$ is at $t = 0$, whereas the mid-point of $g_1(t)$ is at $t = 2$. Hence, we must choose b to satisfy the condition

$$a(2) - b = 0$$

or

$$b = 2a = 2\left(\frac{1}{2}\right) = 1$$

Hence, $g_1(t) = g\left(\frac{1}{2}t - 1\right)$

Proceeding in a similar manner, we find that

$$g_2(t) = g\left(\frac{2}{3}t - \frac{5}{3}\right)$$

$$g_3(t) = g(t - 3)$$

$$g_4(t) = g(2t - 7)$$

Accordingly, we may express the staircase signal $x(t)$ in terms of the rectangular pulse $g(t)$ as follows:

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