

Problem 7

In each of Problems 7 through 12:

- (a) Sketch the graph of the given function.
- (b) Express $f(t)$ in terms of the unit step function $u_c(t)$.

$$f(t) = \begin{cases} 0, & 0 \leq t < 3, \\ -2, & 3 \leq t < 5, \\ 2, & 5 \leq t < 7, \\ 1, & t \geq 7. \end{cases}$$

Solution

Write $f(t)$ in terms of the Heaviside function, $H(t)$, which is defined to be 1 if $t > 0$ and 0 if $t < 0$.

$$\begin{aligned} f(t) &= -2[H(t-3) - H(t-5)] + 2[H(t-5) - H(t-7)] + 1H(t-7) \\ &= -2H(t-3) + 4H(t-5) - H(t-7) \\ &= -2u_3(t) + 4u_5(t) - u_7(t) \end{aligned}$$

