Chapter 6, Solution 69.

$RC = 4 \times 10^6 \times 1 \times 10^{-6} = 4$

$$v_o = -\frac{1}{RC}\int v_i dt = -\frac{1}{4}\int v_i dt$$

For $0 < t < 1$, $v_i = 20$, $v_o = -\frac{1}{4}\int_0^t 20dt = $ -5t mV

For $1 < t < 2$, $v_i = 10$, $v_o = -\frac{1}{4}\int_1^t 10dt + v(1) = -2.5(t - 1) - 5$
$$= \text{-2.5t - 2.5mV}$$

For $2 < t < 4$, $v_i = -20$, $v_o = +\frac{1}{4}\int_2^t 20dt + v(2) = 5(t - 2) - 7.5$
$$= \text{5t - 17.5 mV}$$

For $4 < t < 5m$, $v_i = -10$, $v_o = \frac{1}{4}\int_4^t 10dt + v(4) = 2.5(t - 4) + 2.5$
$$= \text{2.5t - 7.5 mV}$$

For $5 < t < 6$, $v_i = 20$, $v_o = -\frac{1}{4}\int_5^t 20dt + v(5) = -5(t - 5) + 5$
$$= \text{- 5t + 30 mV}$$

Thus $v_o(t)$ is as shown below: