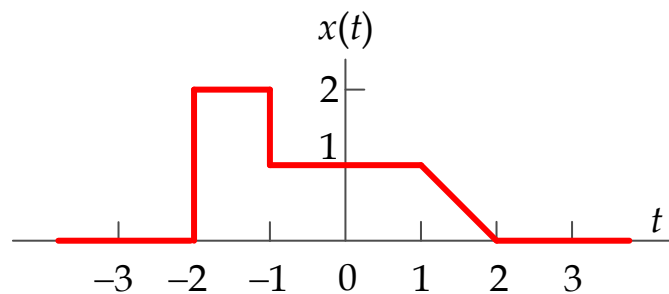


### Common Operations on Signals: Practice Problems

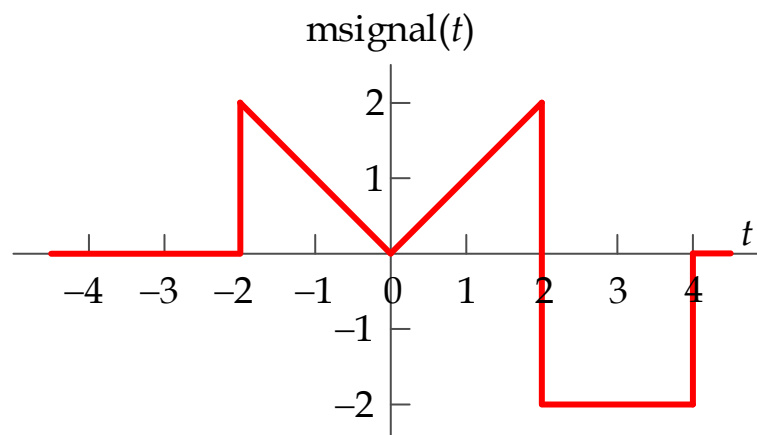
**Q1.** Sketch the following signal by hand.

$$x(t) = 2 u(t + 2) - u(t + 1) - \text{ramp}(t - 1) + \text{ramp}(t - 2)$$

**Q1. Answer.**



**Q2.** For the following signal, called  $\text{msignal}(t)$ , sketch by hand the corresponding signal  $y(t) = \frac{1}{2} \text{msignal}(2t + 3)$ .

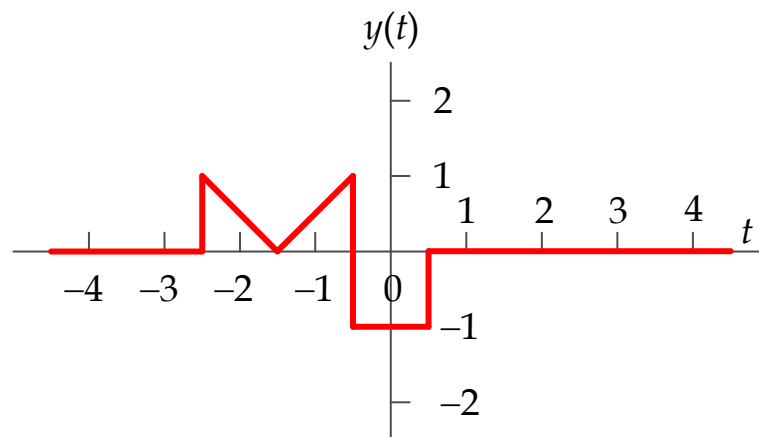


**Q2. Answer.**

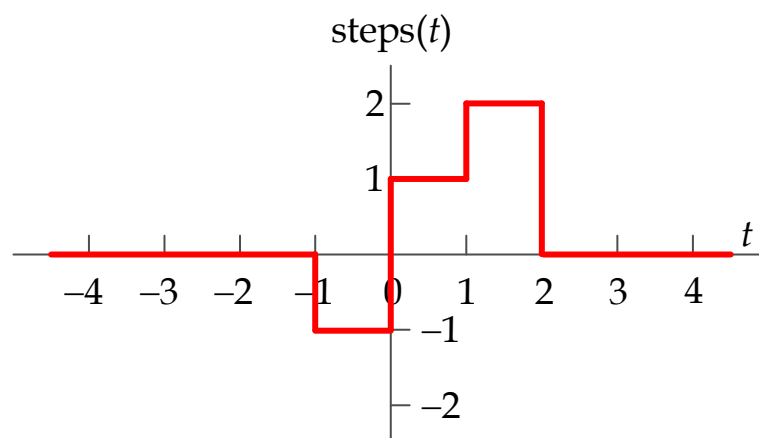
It is easier to solve this problem if we write the operations in the standard form explained during the lecture, so we want to sketch:

$$y(t) = \frac{1}{2} \text{msignal} \left( 2 \left( t + \frac{3}{2} \right) \right)$$

which results in



**Q3.** For the following signal, called  $\text{steps}(t)$ , sketch by hand the corresponding signal  $y(t) = -\text{steps} \left( \frac{-t}{2} - 4 \right)$ .

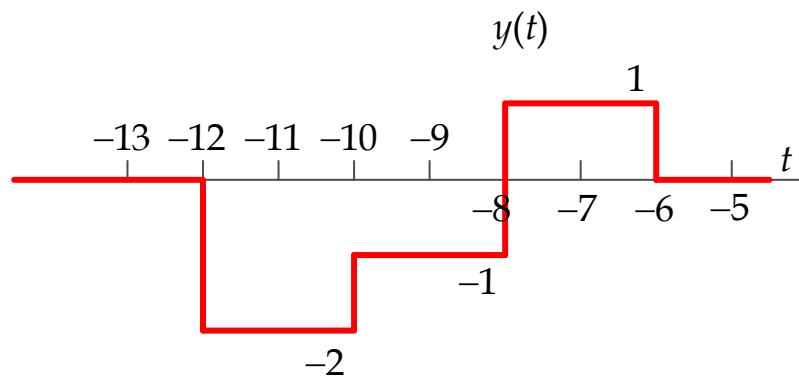


**Q3. Answer.**

It is easier to solve this problem if we write the operations in the standard form explained during the lecture, so we want to sketch:

$$y(t) = (-1) \text{ steps} \left( \frac{-(t+8)}{2} \right)$$

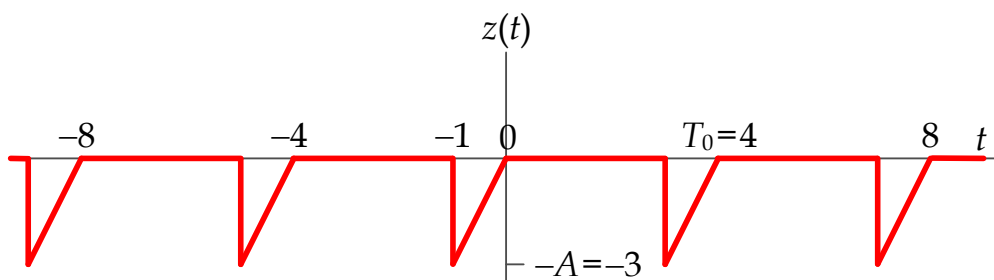
which results in



**Q4.** For the signal  $z(t) = \text{rep}_4\{3 \text{ saw}(t/2) u(-t)\}$ , sketch the signal by hand and find the average power in  $z(t)$ .

**Q4. Answer.**

It is easier to start by drawing  $3 \text{ saw}(t/2)$  then drawing  $u(-t)$  then repeating the resulting multiplication every 4 seconds. The final shape of the signal  $z(t)$  is:



$$P_x = \frac{1}{4} \int_{-1}^0 |3t|^2 dt = 0.75 \text{ Watt}$$