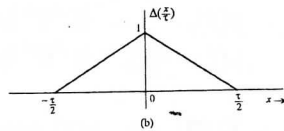
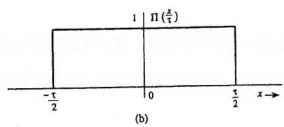


5. (6p.) In a binary transmission scheme, the following two waveforms are used:

$$s_1(t) = \Pi\left(\frac{t - 0.001}{0.002}\right) \quad \text{and} \quad s_2(t) = -\Delta\left(\frac{t - 0.001}{0.002}\right),$$

where the pulses  $\Pi(t/\tau)$  and  $\Delta(t/\tau)$  are defined as shown below.



The signaling rate is 500 pulses per second. Both signals are equally likely, and they are transmitted across an AWGN channel where the noise PSD is  $2 \cdot 10^{-4}$  W/Hz.

- Find the minimum energy equivalent signal set. (*Hint:* it is not necessary to find a signal space representation for  $s_1(t)$  and  $s_2(t)$  to solve this.)
- Determine the error probability of the optimum receiver.