1.Let the sequence $\{x_n\}_{n=1}^{\infty}$ be a bounded sequence. Let E be the set of limit points of the sequence.

(a) $I = \inf\{E\}$ is an element of E.

(b) Show that for every $\epsilon > 0$

  (i) There exists $N > 0$ such that $I - \epsilon < x_n$ for all $n \geq N$.

  (ii) For all $N > 0$ there exists $n > N$ such that $x_n < I + \epsilon$.

2. Let $\{a_t\}_{t\in\mathbb{Z}}$ and $\{b_t\}_{t\in\mathbb{Z}}$ be two bi-infinite sequences. Define the convolution c of a and b by

$$c_t = \sum_{s=-\infty}^{\infty} a_s b_{t-s}.$$

For each of the following cases compute c when

1. $a_t = \begin{cases} 1 & \text{if } t = -2, 0, 1 \\ 2 & \text{if } t = -1, 2 \\ 0 & \text{otherwise} \end{cases}$ and $b_t = \delta_{-2}(t)$ for all $t \in \mathbb{Z}$.

2. $a_t = u_t$ and $b_t = \begin{cases} 1 & \text{if } t = 2 \\ -1 & \text{if } t = 3 \\ 0 & \text{otherwise} \end{cases}$