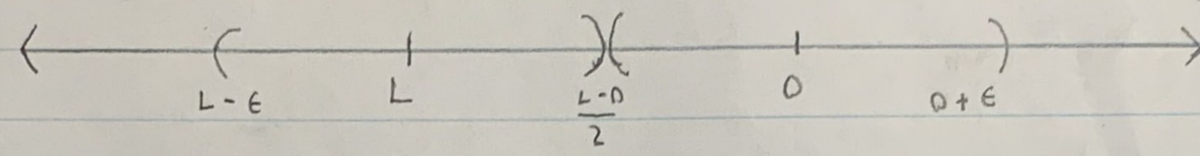
Q1a) Assume that the $\lim_{n\to\infty} a_n = L$ and $L < 0$, we can show this interval on the number line:

$(\epsilon > 0)$



- For the limit of a_n to be L, then the tail of $\{a_n\}$ must be in the interval $(L-\epsilon, \frac{L-0}{2})$ or;

$$a_n \in (L-\epsilon, \tfrac{L}{2}) \qquad (\epsilon > 0,\ a_n \geq 0,\ L < 0)$$

- However, this is a clear contradiction as $(L-\epsilon)$ must be negative and $(\frac{L}{2})$ must also be negative as well. But a_n is positive, which means that a_n is not contained within the interval L so it follows that $L < 0$ cant be the limit of the sequence.

$\therefore$ Since a_n can be contained within the open interval L if $L \geq 0$, then $\lim_{n\to 0} a_n = L$ for all $L \geq 0$