**Problem 1** Consider an LTI system with input $x[n]$ and impulse response $h[n]$ sketched below.

- $h[n]$ is non-zero between $N_2$ and $N_3$
- $x[n]$ is non-zero between $N_0$ and $N_1$

Determine the indexes of the first and last non-zero output points of $y[n] = h[n] * x[n]$.

**Problem 2** Consider an LTI system with freq. response

$$H(e^{j\omega}) = \frac{1 - e^{-j\omega}}{1 + \frac{1}{2} e^{-j\omega}} \quad -\pi < \omega < \pi$$

Determine output $y[n]$ when $x[n] = \sin(\frac{\pi}{4} n) + n$

(Hint: can you write $x[n]$ as sum of eigenfunctions?)