Tutorial sheet no. :- 09

question no. 01 → Obtain the frequency-sampling realization of FIR filter, whose system function $H\{z\}$ is characterized by the set of frequency samples $\{H(k+\alpha)\}$ as given below

$$H\{z\} = \frac{1 - z^{-M} e^{j\pi\alpha}}{M} \sum_{k=0}^{M-1} \frac{H(k+\alpha)}{1 - e^{j2\pi(k+\alpha)/M} z^{-1}}$$

Also comment abouts its poles and zeros in z-domain

question no. 02 → Convert the analog bandpass filter with system function

$$H_a(s) = \frac{1}{(s+0.1)^2 + 9} \qquad\longrightarrow Ⓐ$$

into a digital IIR filter by use of the backward difference for the derivative. Determine its poles and zeros at $T = 0.1$.

Hint :- $s = \dfrac{1 - z^{-1}}{T}$

question no. 03 → Convert the analog bandpass filter $H_a(s)$ (as mentioned in question no. 02; Eq. Ⓐ) into a digital IIR filter by use of the mapping

$$S = \frac{z - z^{-1}}{T}$$