Indian Institute of Technology Hyderabad
EE6310: Image and Video Processing
Quiz 1, 23.02.2023, 10 points

1. Linearly and circularly convolve the following pair of signals. $x[n] = \cos(\pi n)\ \ (0 \leq n \leq 3)$ and zero elsewhere; $h[n] = 0.5(\delta[n] - \delta[n-1])$. For circular convolution, assume $N = 4$. (2)

2. Given a low-pass filter $H(i, j)$, is it possible to generate a high-pass filter from it? If yes, clearly specify how. If no, clearly justify why not. (2)

3. Find the N-point DFT of a one-dimensional averaging filter of length M (with $M < N$). Comment on the impact of M on the frequency response in terms of frequency ripple. (2)

4. In the HW assignment you were asked to verify that IDFT[DFT[I]] = I. Prove this result. For simplicity, operate in one dimension and assume an N-point DFT. (2)

5. Given that the phase spectrum of a non-zero image I is zero. What can you say about I? Give two examples of such an I in the pixel domain. (2)