# ECE 351 DSP: Practice Problems 1

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1) Is the region in Figure 1 an ROC of z-transform of some signal?

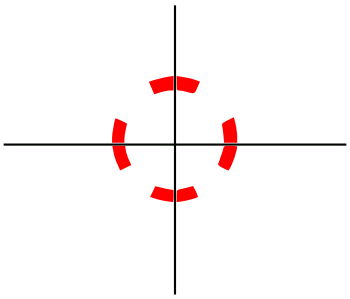

Fig. 1: Figure for Question 1

2) Consider an LTI system with unit sample response $h[n] = \binom{2n}{n} p^n u[n]$. For what values of $p \geq 0$ is the system stable? Is it causal?

3) Let $x[n] = 3\cos(\frac{\pi}{2}n + \frac{\pi}{6}) - 2\sin(\frac{\pi}{2}n + \frac{\pi}{3})$. Consider passing $x[n]$ through an LTI system with unit sample response $h[n] = \frac{n}{2^n}u[n]$. Calculate the output.

   [**Hint**: Do not try doing this brute-force via convolution. You will end up nowhere. Instead, carefully browse through the results covered in class.]

# I. Answers

1) No.

2) $0 \leq p < \frac{1}{4}$. Yes it is causal.

3) $\frac{1}{5}\left[6\cos(\frac{\pi}{2}n + \frac{7\pi}{6} + \tan^{-1}\frac{3}{4}) - 4\cos(\frac{\pi}{2}n + \frac{5\pi}{6} + \tan^{-1}\frac{3}{4})\right]$.