

ECPE 121: Digital Signal Processing
Exam 6 part b (13 points)

Use Matlab/sptool to help design a stable, causal, bandpass filter for use in a system operating at a sampling rate of 16,000 samples/sec. The filter must have a **maximum gain of 1 at $F = 2\text{kHz}$** , and must have **zero gain at both $F = 0$ and $F = 8\text{kHz}$** .

1. Sketch the pole-zero plot of the filter.
2. Determine the transfer function of your filter. Show all the design work leading to your result.
3. Use Matlab to obtain the magnitude response plot of the filter you designed. The frequency axis in the plot must be in units of kHz. Place a marker at the point on the plot where the filter gain is maximum. Include a screenshot of the filter gain in your submission.