DIGITAL SIGNAL PROCESSING – EC5011

LABORATORY SESSION 2

DIGITAL SIGNAL PROCESSING THEORY AND APPLICATION

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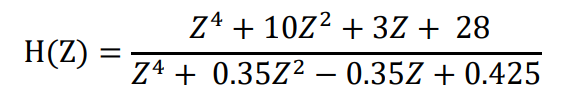
2022/E/039

GROUP CG03

SEMESTER 05

28 APRIL 2025

**PART 1: ANALYSIS OF A DIGITAL FILTER**



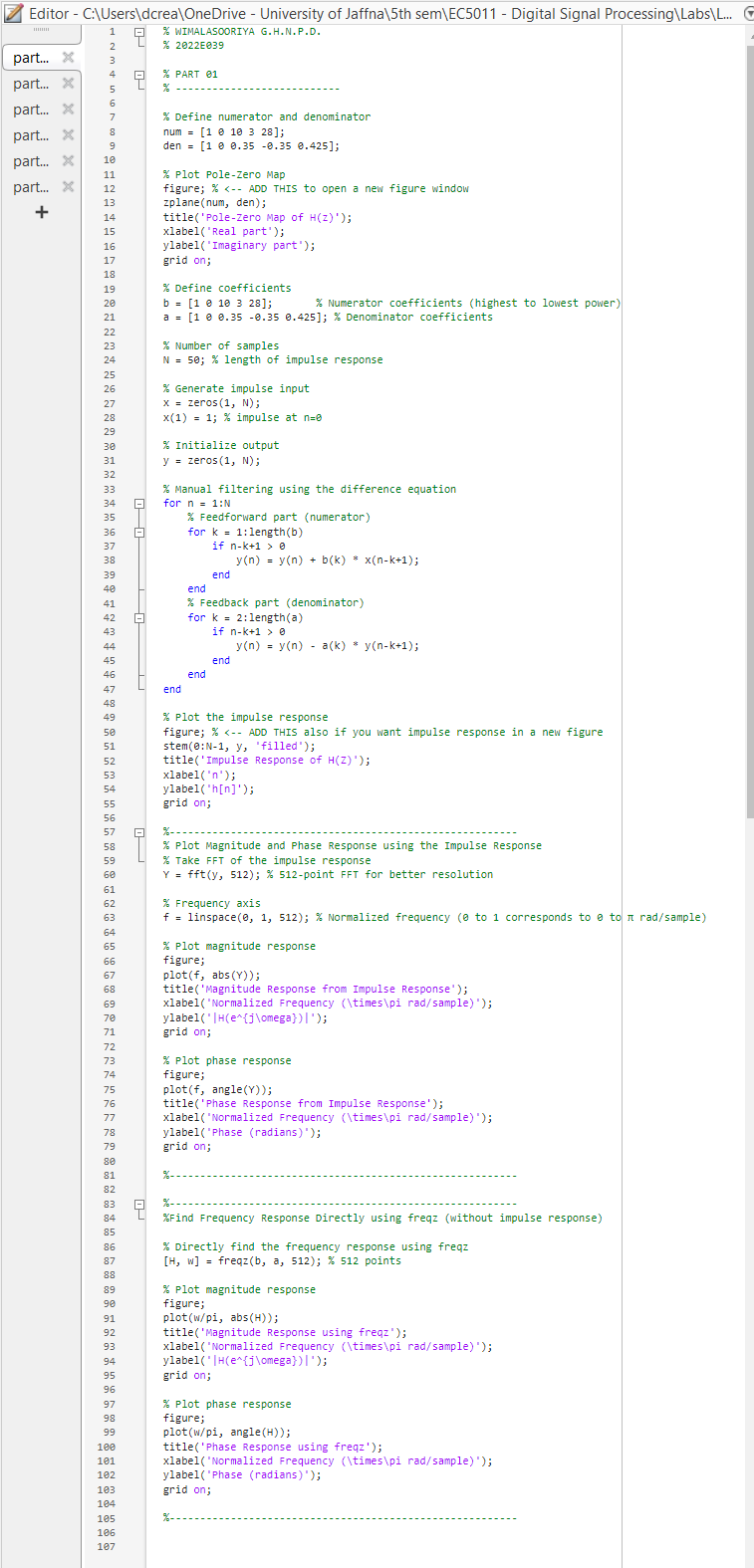


FIGURE 01: CODE

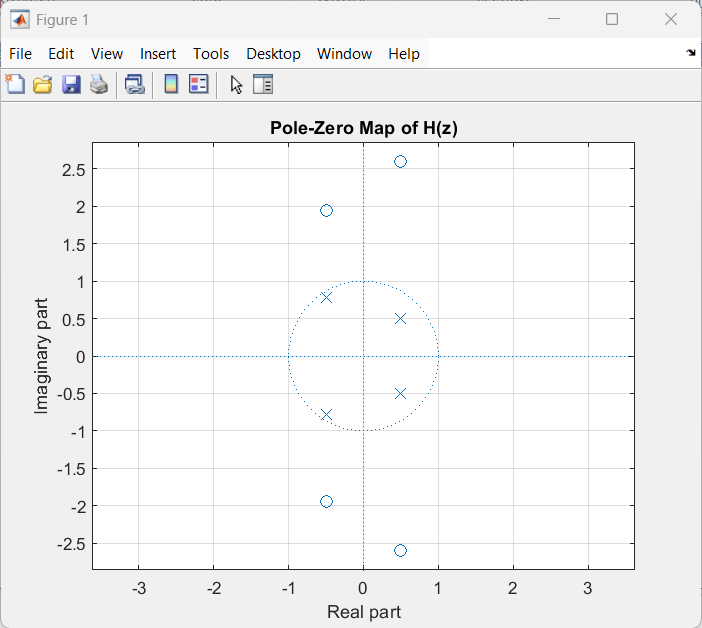


FIGURE 02: ZEROS & POLES

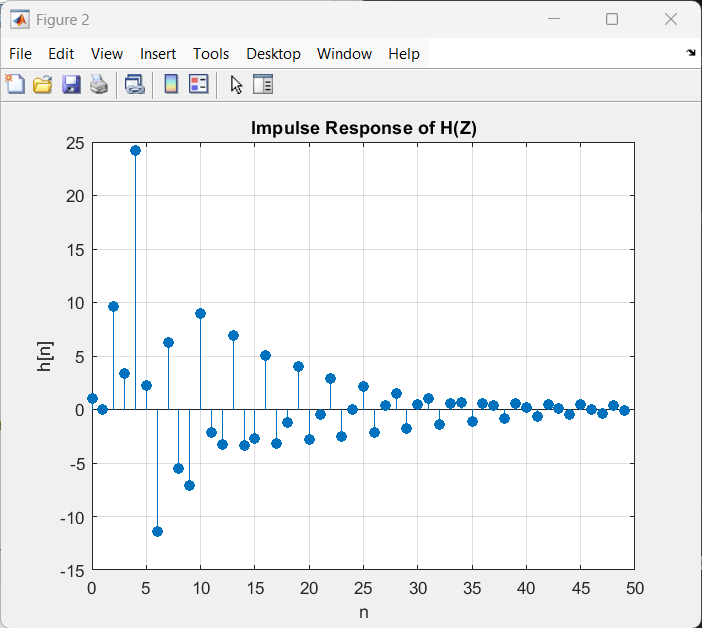


FIGURE 03: IMPULSE RESPONSE

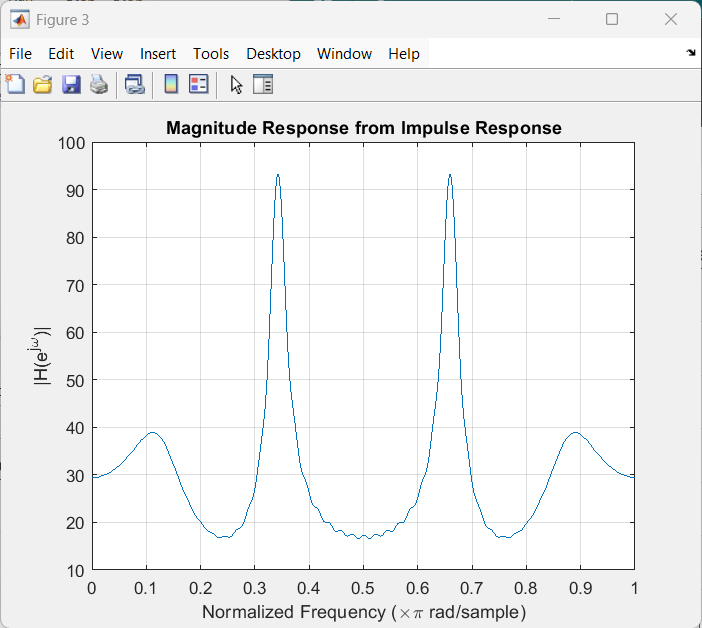


FIGURE 04: MAGNITUDE RESPONSE

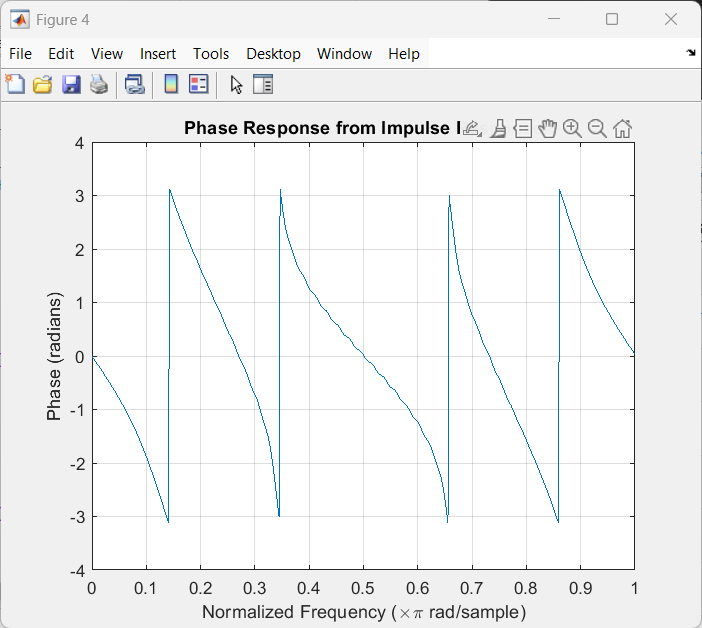


FIGURE 05: PHASE RESPONSE

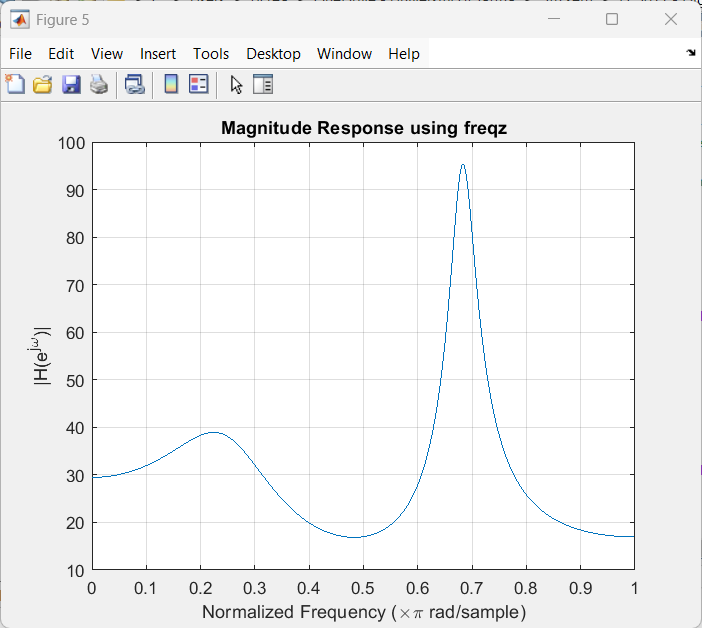


FIGURE 06: MAGNITUDE RESPONSE USING freqz

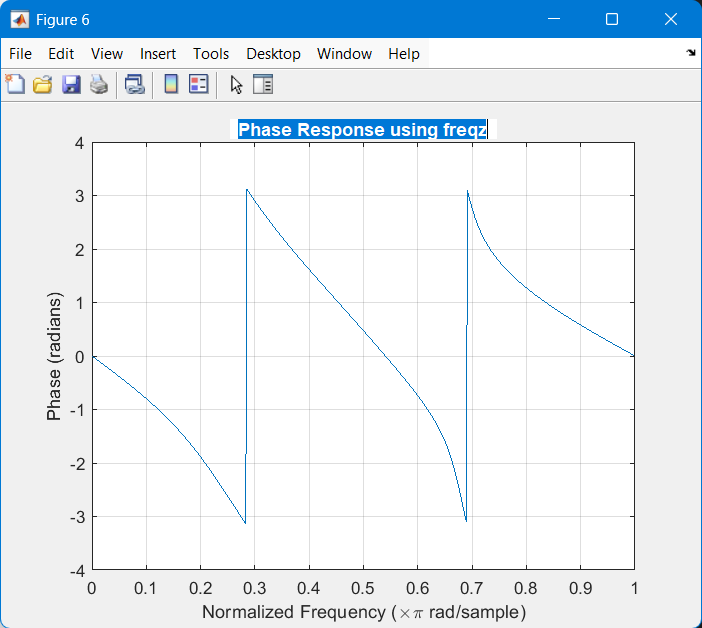


FIGURE 07: PHASE RESPONSE USING freqz

**PART2: DIGITAL FILTER DESIGN IN MATLAB**

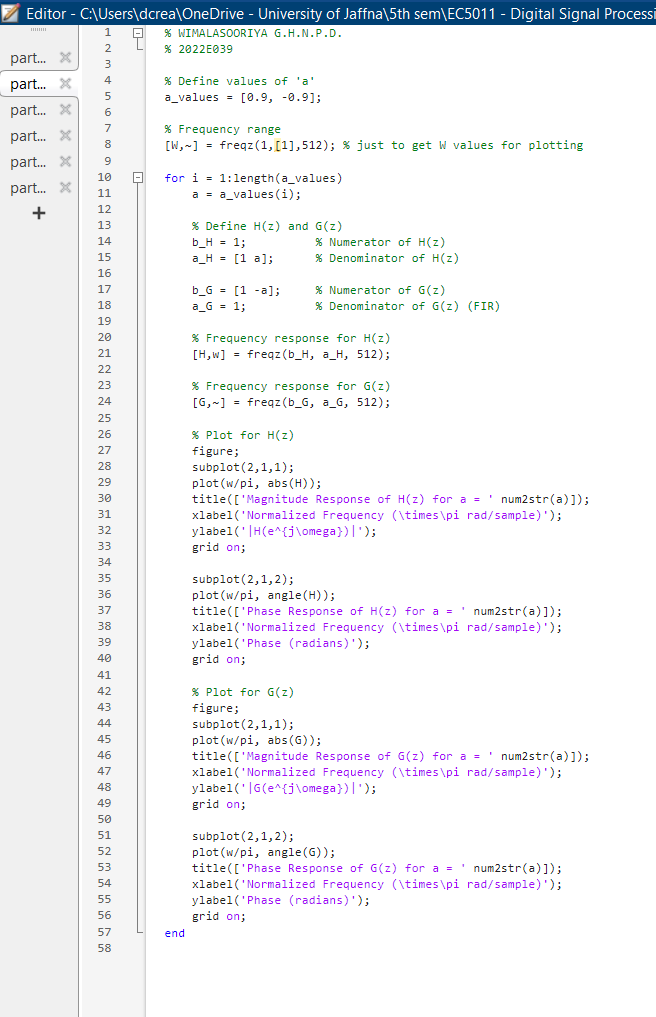
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FIGURE 08: CODE

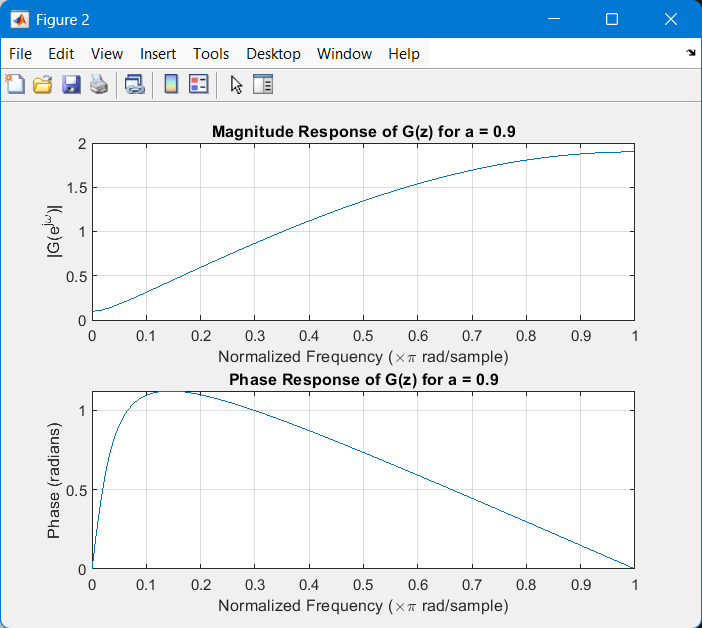


FIGURE 09: MAGNITUDE & PHASE RESPONSE OF G(Z) FOR A = 0.9

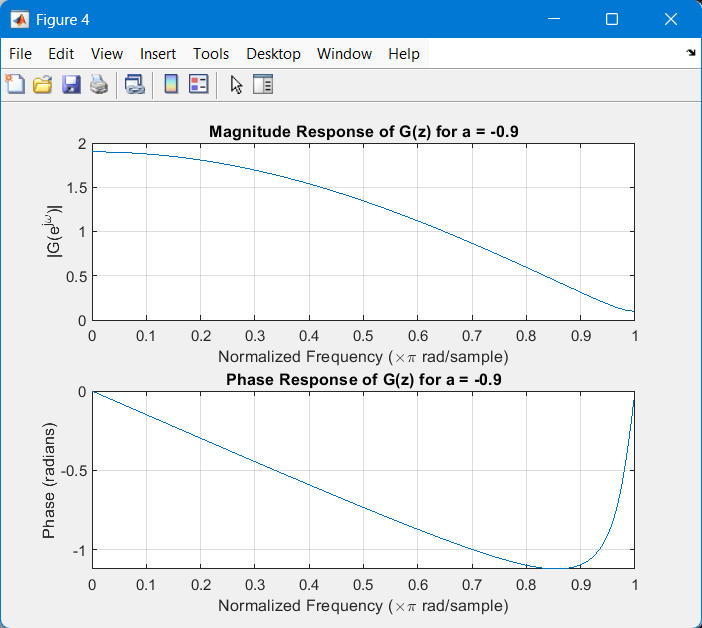


FIGURE 10: MAGNITUDE & PHASE RESPONSE OF G(Z) FOR A = -0.9

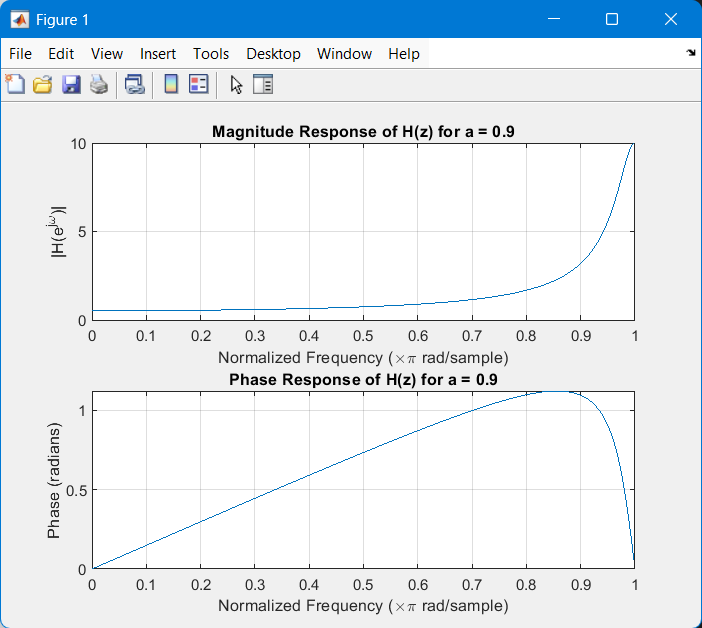


FIGURE 11: MAGNITUDE & PHASE RESPONSE OF H(Z) FOR A = 0.9

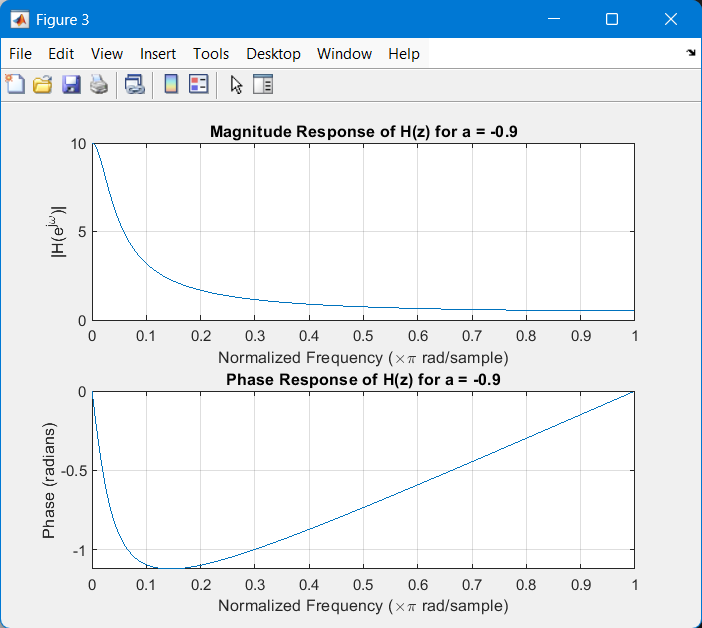


FIGURE 12: MAGNITUDE & PHASE RESPONSE OF H(Z) FOR A = -0.9

**PART3: ALLPASS FILTER**

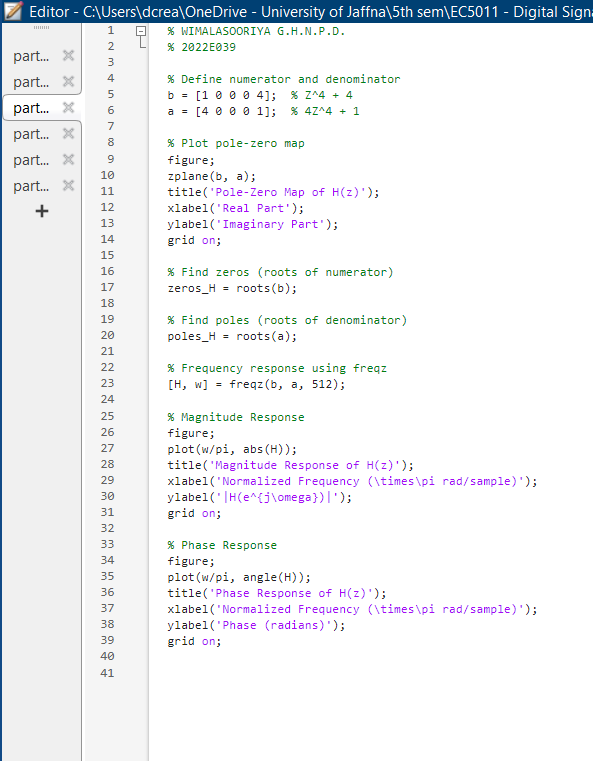
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FIGURE 13: CODE

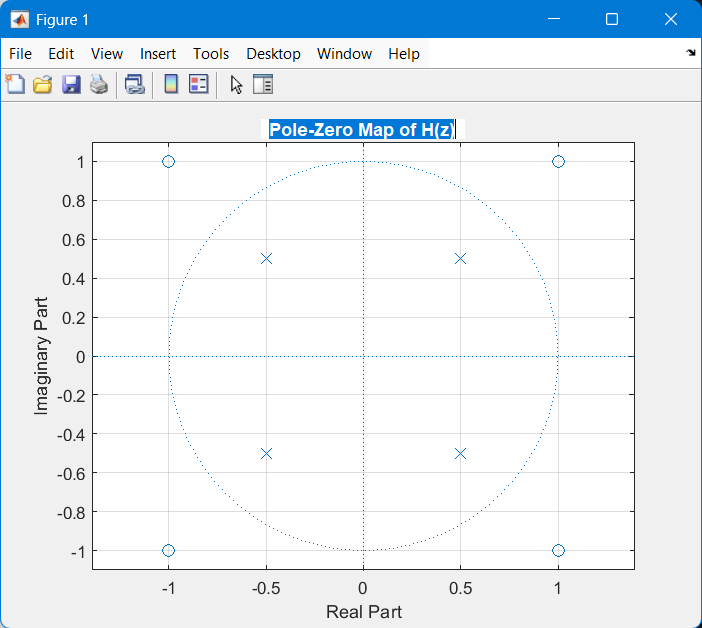


FIGURE 14: POLE-ZERO MAP OF H(Z)

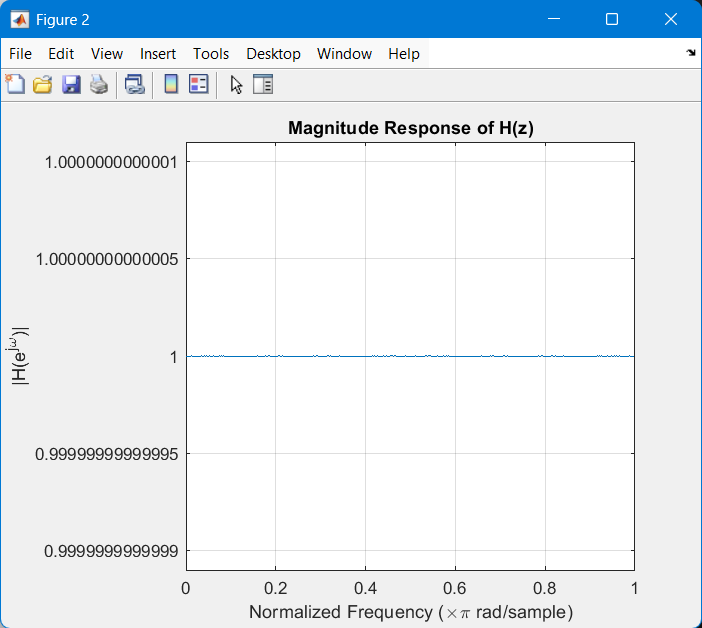


FIGURE 15: MAGNITUDE RESPONSE OF H(Z)

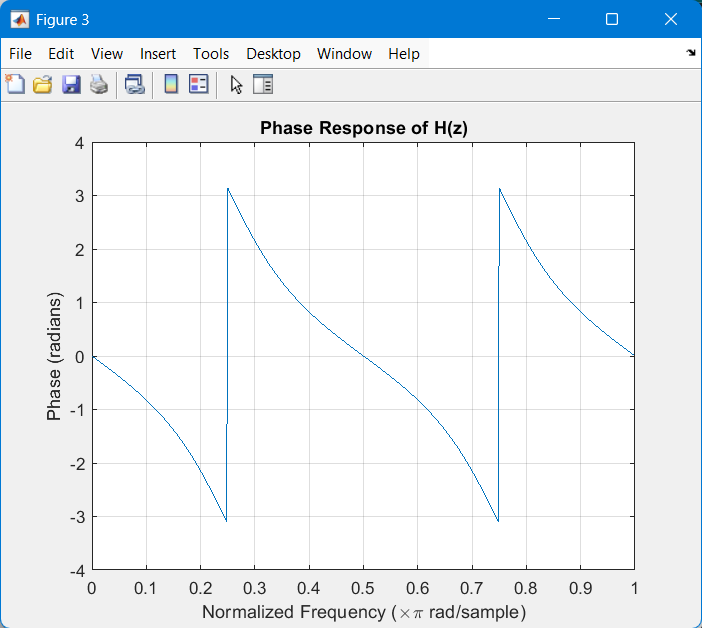


FIGURE 16: PHASE RESPONSE OF H(Z)

**PART4: MIN PHASE, MAX PHASE & MIXED PHASE**

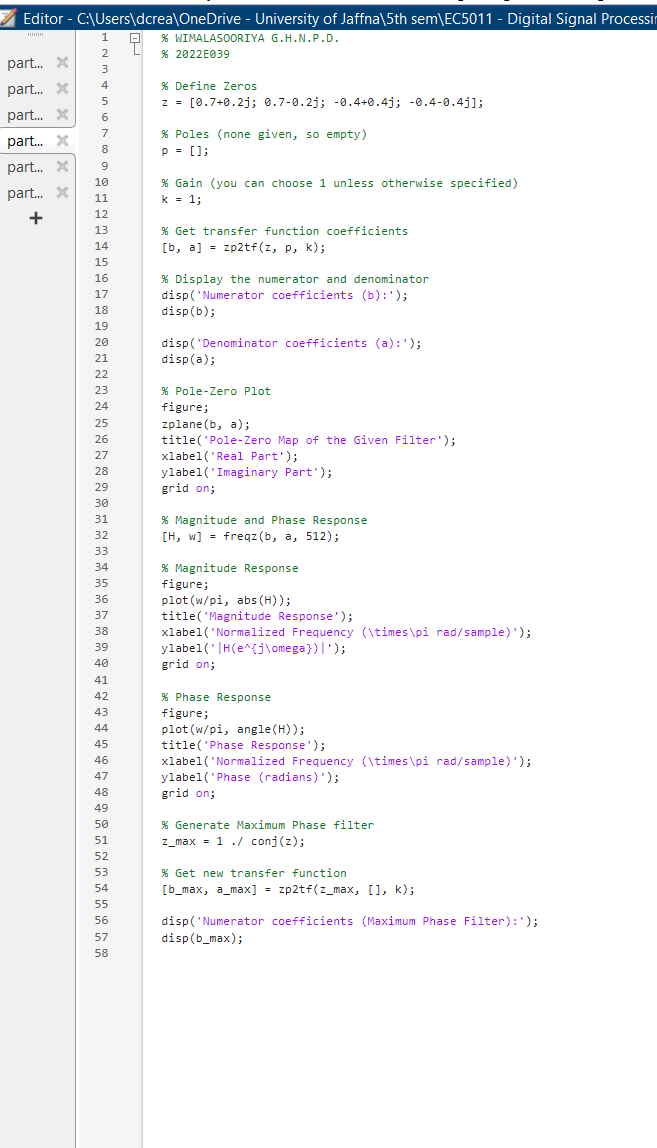
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FIGURE 17: CODE

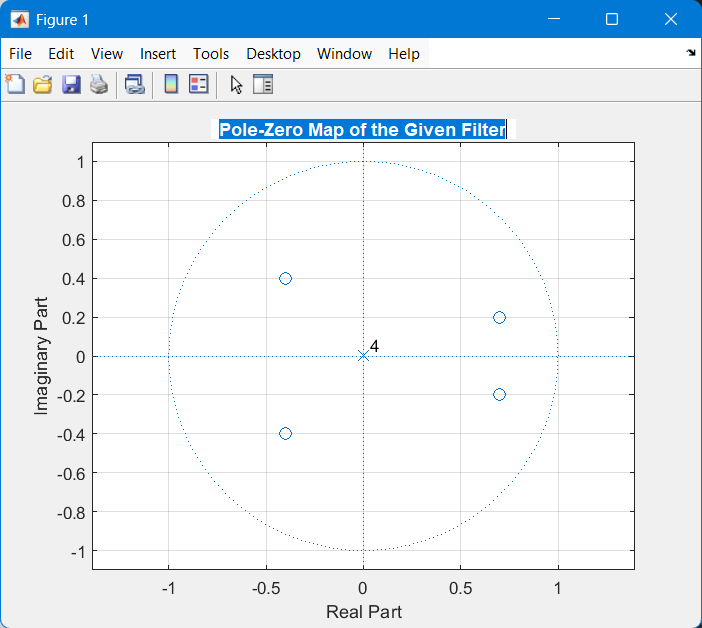


FIGURE 18: POLE-ZERO MAP

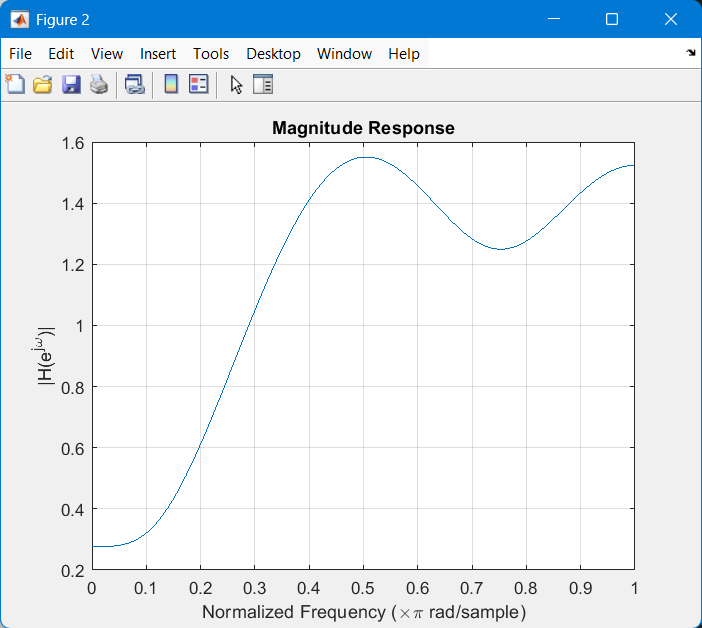


FIGURE 19: MAGNITUDE RESPONSE

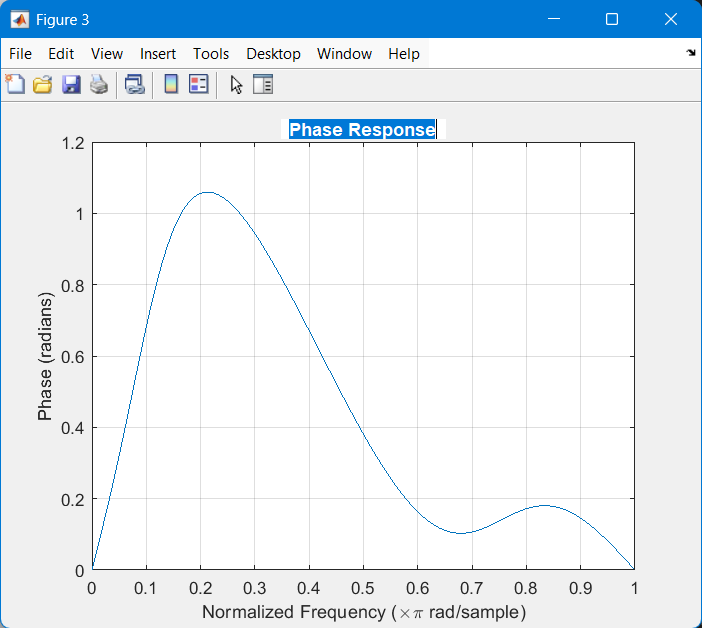


FIGURE 20: PHASE RESPONSE

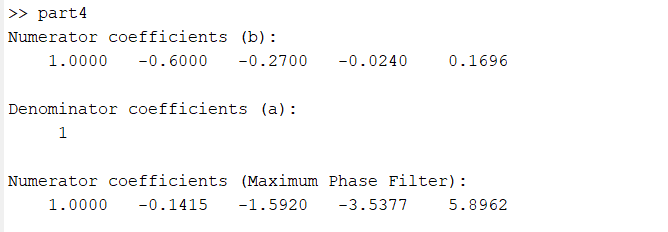


FIGURE 21: TERMINAL OUTPUT

**PART5: LINEAR PHASE FILTER**

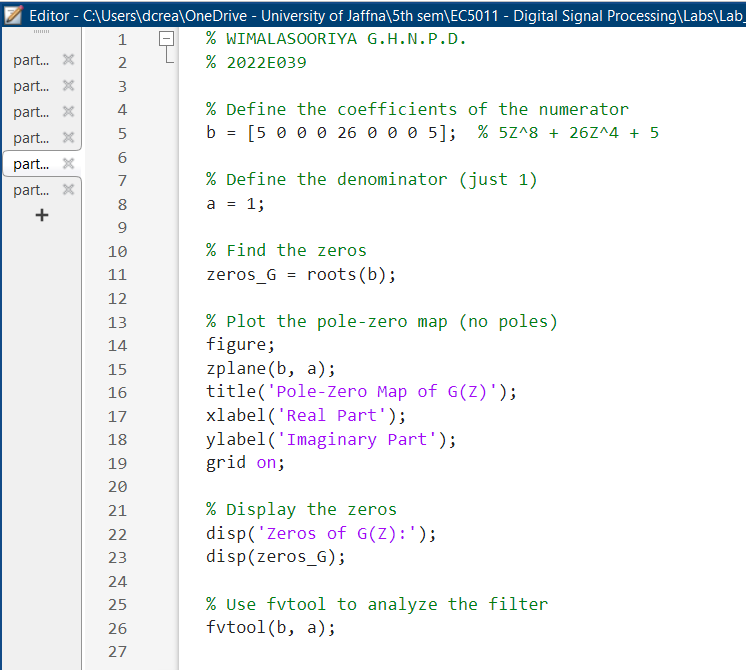
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FIGURE 22: CODE

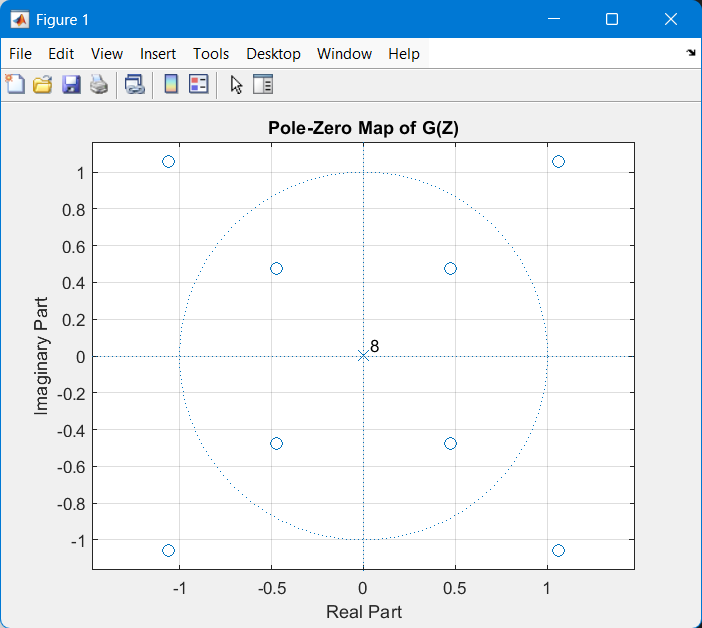


FIGURE 23: POLE-ZERO MAP

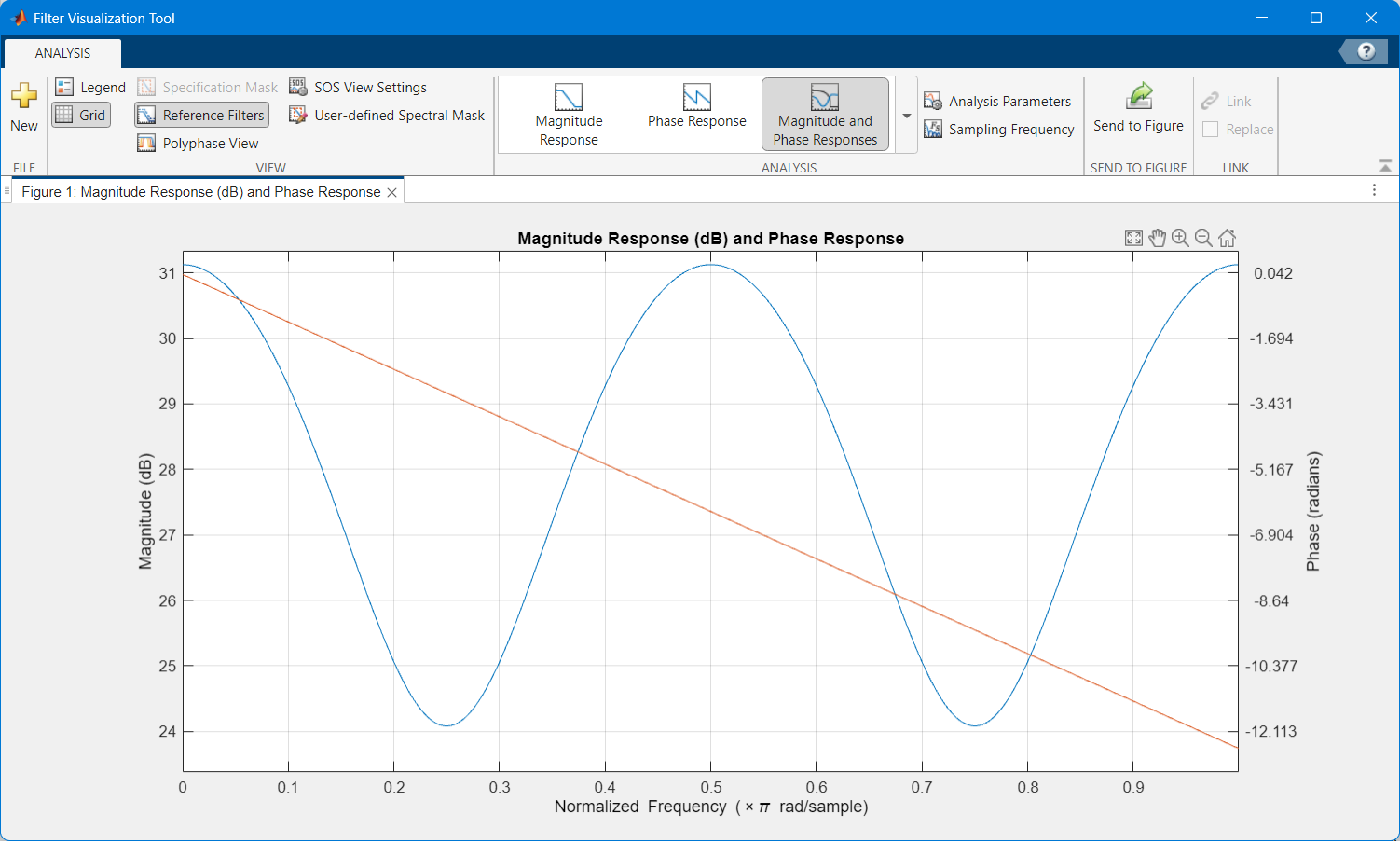


FIGURE 24: MAGNITUDE RESPONSE (dB) & PHASE RESPONSE

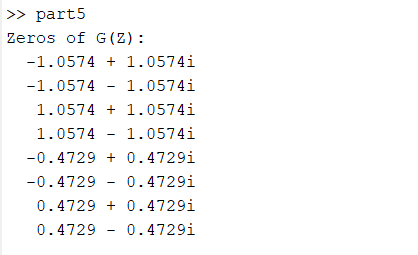


FIGURE 25: TERMINAL OUTPUT

**PART6 (OPTIONAL): FAST FOURIER TRANSFORM IMPLEMENTATION**

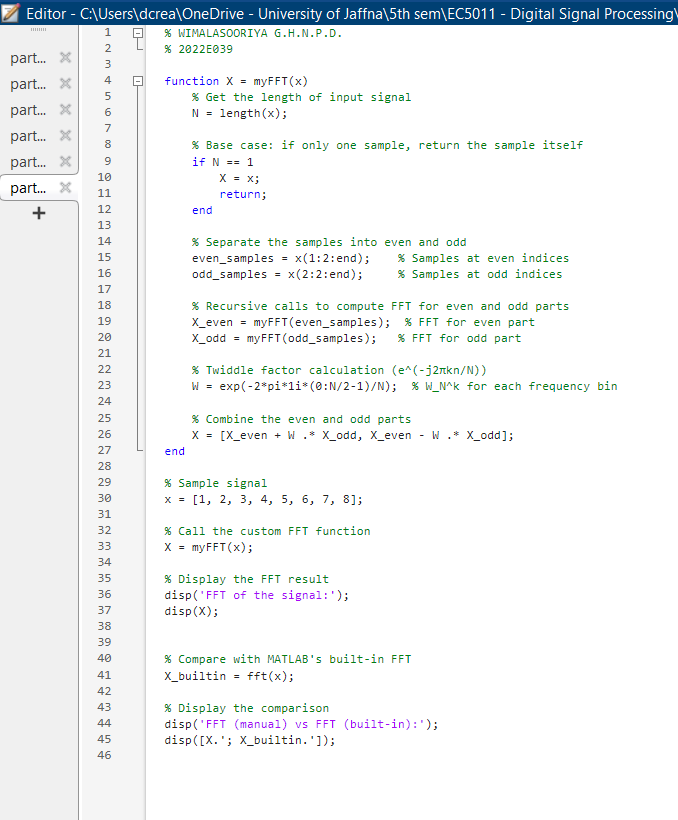
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FIGURE 26: CODE

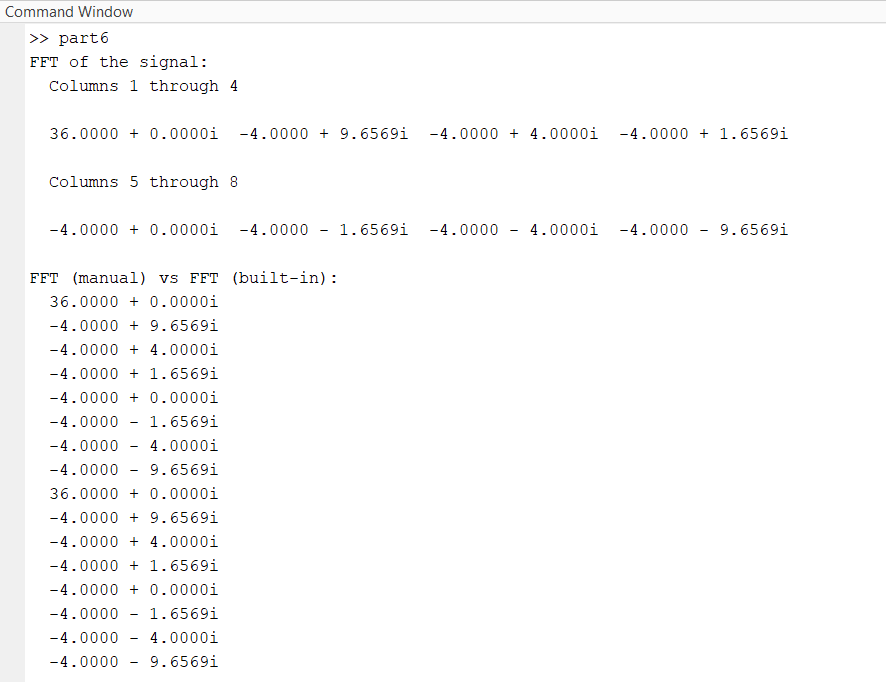


FIGURE 27: TERMINAL OUTPUT