

# University of Nebraska-Lincoln

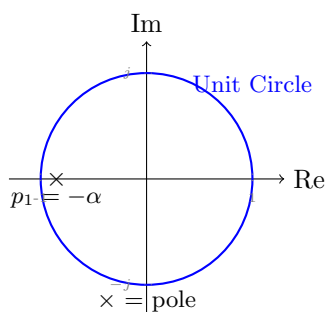
## Digital Signal Processing: Quiz 6

November 7, 2025

Name: \_\_\_\_\_

Total Points: 10

**Given:** A discrete-time LTI system has the following pole-zero plot in the z-plane:



The pole is located at  $z = -\alpha$  (where  $0 < \alpha < 1$ ).

The corner frequency is then:  $\omega_c = \pi - \arccos(\alpha)$

Assume  $10\omega_c$  is within the Nyquist frequency range ( $10\omega_c < \pi$ ).

1. **(10 points)** Based on the pole-zero plot above,
  - (a) **(6 points)** Sketch an approximation of the magnitude  $|H(e^{j\omega})|$  and phase  $\angle H(e^{j\omega})$  response.
  - (b) **(2 points)** In 1-2 sentences, explain how the pole location influences the shape of the magnitude and phase responses.
  - (c) **(2 points)** What type of filter does this system represent (e.g., low-pass, high-pass, band-pass, band-stop)?

