Exercise 6.1 (Stability)

Determine which of the following systems are stable:

$$H_1(z) = \frac{z}{z^2 - 3z + 2}$$

$$H_2(z) = \frac{z - 2}{z^2 - 1.344z + 0.9025}$$

$$H_3(z) = \frac{z^2 + 0.4z}{z^2 - 1.556z + 1.21}$$

$$H_4(s) = \frac{s}{s^2 + 1}$$

$$H_5(s) = \frac{s + 2}{s^2 - 1.344s + 0.9025}$$

Exercise 6.2 (Impulse Response)

Determine the impulse response for the following transfer function:

$$H(z) = \frac{z}{z^2 + 0.8485z + 0.36}$$

1. Draw a pole-zero diagram for the system.
2. Determine whether the system is stable.
3. Plot the impulse response of the system with n=0:15. (try different functions / ways)

Exercise 6.3 (Frequency Response)

Consider the following transfer function:

$$H(z) = \frac{z^2 + 0.6888z + 0.81}{z^2 - 1.131z + 0.64}$$

The sampling rate is 8 kHz. Analyze the system as follows:

1. Determine at which frequencies the gain of $H(f)$ is maximum and minimum.
2. Determine the phase (using graphical methods) of $H(f)$ at a frequency of 4 kHz.
3. Plot a Bode diagram of $H(z)$, and check if the above results are correct.