Exercises Week 10
DSP

1. A digital filter has the following properties:
   - it is a high-pass filter of order 1
   - the pole is situated at a distance 0.9 from the origin
   - continuous signals are completely blocked by the filter

Requirements:

   a. Draw the pole-zero diagram and find the system function $H(z)$
   b. Compute the amplitude response and the phase response of the filter
   c. Normalize the filter such that $|H(\pi)| = 1$
   d. Find the output signal $y[n]$ if the input signal is $x[n] = 2\cos(\frac{\pi}{6}n + \frac{\pi}{4}), n \in \mathbb{Z}$