4^{th} Exercise in Digital Information Processing

1. The pole-zero scheme of a transfer function $H(z)$ has a zero at $z = 0$ and two conjugate-complex poles at $z = 3/4 \pm j/2$.
   Compute $H(z)$!
   Compute the difference equation for the system and plot an equivalent circuit.

2. Is the system with the difference equation

$$y[n] = ay[n-1] + 2\delta[n]$$

   stable?
   Find a solution in the time domain and in the Z-domain.

3. Given is the following transfer function:

$$H(z) = \frac{1}{(z-1)(z-3)}.$$

   Determine a Laurent series of $H(z)$ for $1 < |z| < 3$ and $|z| > 3$. By looking at these series find out if the system is causal.
   Analyse if the system is stable by looking at the pole-zero representation of the system.