## Lab 7 <br> EE 324: Signals and Systems II

We will utilize z transformation to analyze several more discrete time dynamical systems.

## 1 Prelab assignment

1. Derive the transfer function of the system

$$
\begin{equation*}
y[k]-1.3 y[k-1]+0.4 y[k-2]=x[k] . \tag{1}
\end{equation*}
$$

2. Derive the transfer function of the system

$$
\begin{align*}
y[k]-1.8 y[k-1] & =c[k]+x[k]  \tag{2a}\\
c[k] & =\alpha y[k-1] \tag{2b}
\end{align*}
$$

with input $x$ and output $y$.

## 2 Lab assignment

1. Realize system (1) through transfer function block.
2. Realize system (1) through cascade connection of two first order systems.
3. Realize system (1) through parallel connection of two first order systems.
4. Compare the responses of 1 to 3 with input $x[k]=1, x[k]=1.5^{k}$ and $x[k]=3^{k}$.
5. Realize system (2) through feedback connection.
6. Simulate the impulse response and the step response for three sets of parameters:
i) $\alpha=0$
ii) $\alpha=1$
iii) $\alpha=-1$
with zero initial conditions. Discuss your observation.
