Laboratory One: week 2 and week 3 (5 marks in total)

1. Student name, number and signature

2. Student name, number and signature

3. Student name, number and signature

Learning Outcomes

- Build capability to perform real-time control system simulation using MATLAB/Simulink

Laboratory I: Activities

- Build a Simulink simulator for a system with first order transfer function $G(s) = \frac{0.5}{s+1}$. Apply a step input signal with a unit amplitude to this system and observer its output. What is the magnitude of the output?

- Build a simulator for proportional closed-loop feedback control of this first order system. Starting with the the feedback controller $K = 1$ and increasing it to $K = 10$, observer the output of the control system with the step reference signal. What are the steady-state errors of the closed-loop system for $K = 1$ and $K = 10$ respectively?

- Build a Simulink simulator for a system with third order transfer function $G(s) = \frac{0.5(s-0.25)}{(s+0.5)(s+1)(s+5)}$. Apply a sinusoidal input signal $u(t) = sin(0.1t)$ to this system and observer its output. What is the magnitude of the sinusoidal output?

- Build a simulator for proportional closed-loop feedback control of this third order system. Starting with the the feedback controller $K = 10$ and increasing it to $K = 100$, observer the output of the control system with the sinusoidal reference signal. Is this closed-loop system stable with both proportional controllers? Where are the closed-loop poles when using the proportional controller $K = 100$?