CSE245 Spring 2023 Homework 2

Due Time: 11:50pm, Wednesday, May 17, 2023 Submit to Gradescope
Gradescope: `https://gradescope.com/`

1. Analytic solution: Use the circuit of Lecture 2 page 13 to derive the analytic solution assuming that initial solution $x(t = 0) = 0$.
1.1 The input is an impulse waveform.
1.2 The input is a ramp function.

2. Laplace transform: Following problem 1, derive the Laplace transform when input is a ramp function.
2.1. Assume that s approaches zero.
2.2. Assume that s approaches infinite.

3. Moments: Derive the moments of i_{12} in problem 2 from moment 0 to moment k=4.

4. Moments: Derive the moments of v_2 in problem 2 from moment 0 to moment k=4. Use moments to analytically predict the cross-talk noise due to v_s in terms of magnitude and propagation delay.

5. Given the moments of problem 3, how do we derive the delay of i_{12} using deep learning? Discuss potential approaches on one page with references.

6. Following the lecture on 5/2, derive the conjugate gradient algorithm using T_m^{-1}.