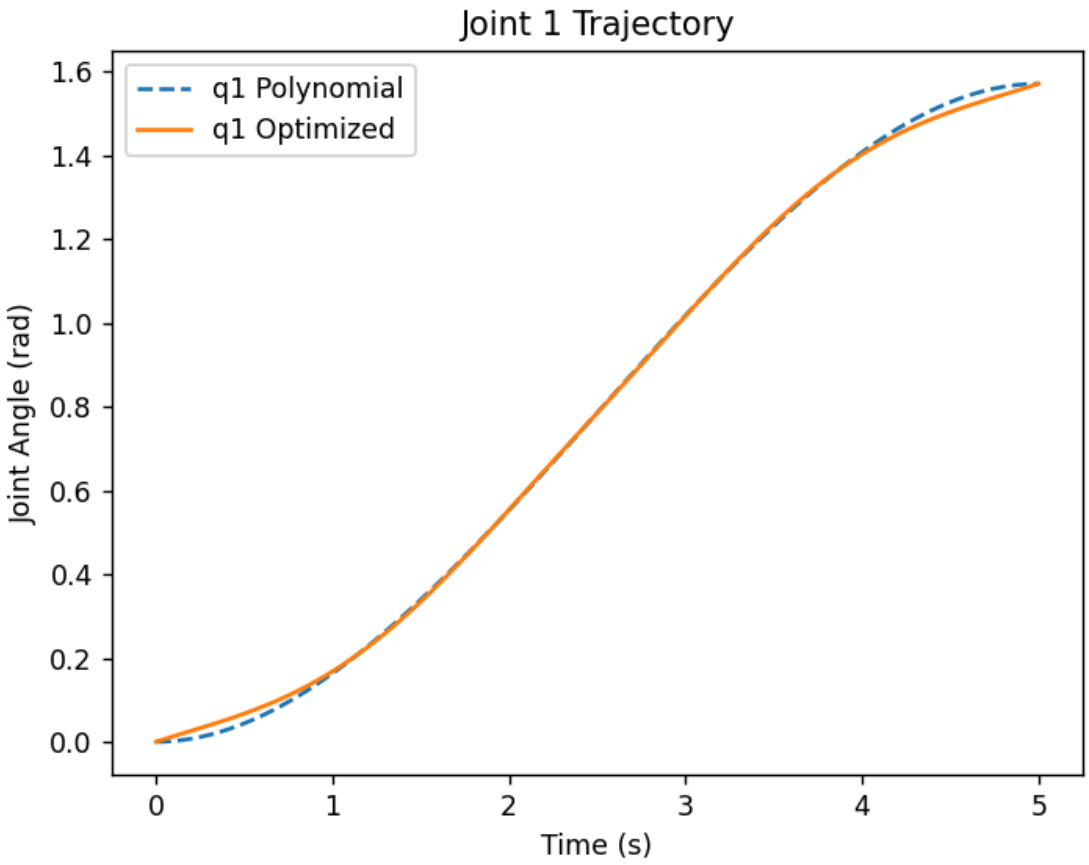
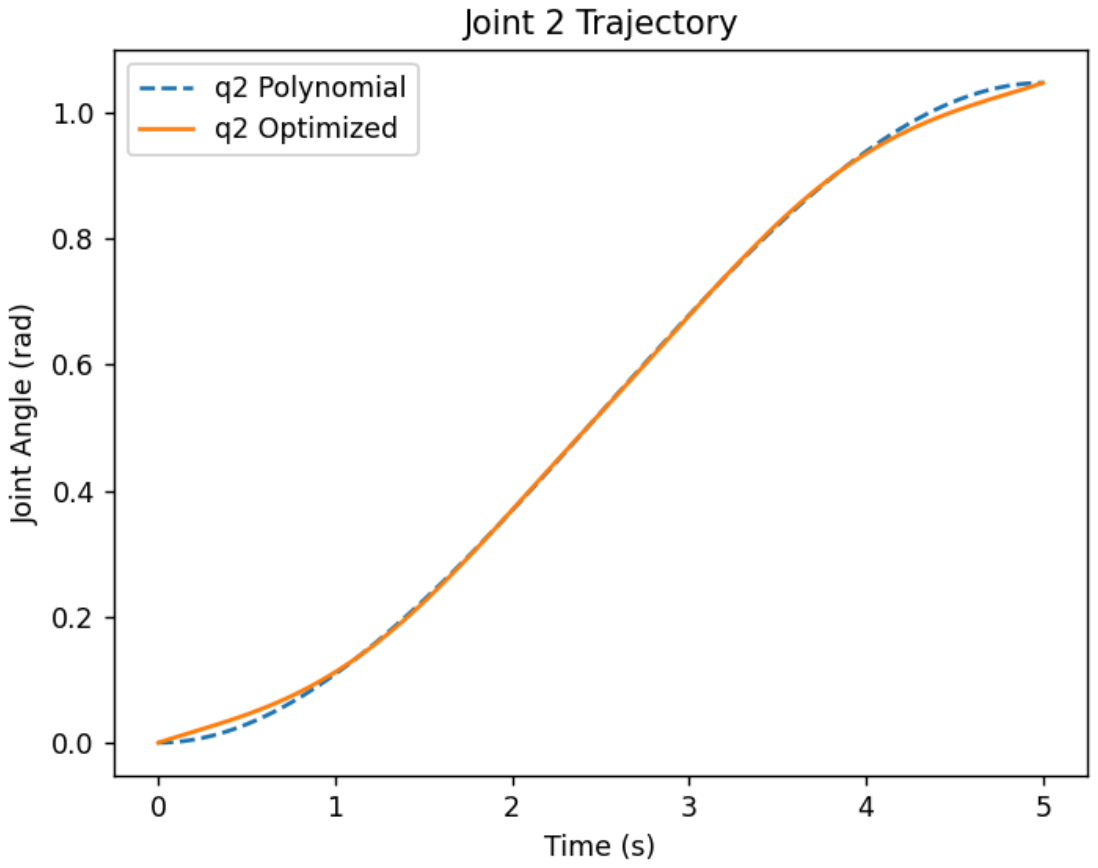
Assignment 3:

Plots:





Discussion:

The polynomial trajectory provides a smooth motion but does not explicitly minimize any physical performance criterion. In contrast, the optimized trajectory is generated by minimizing the sum of squared joint accelerations, resulting in smoother motion with reduced abrupt changes. The optimized joint profiles appear more gradual, especially near the start and end of motion. This leads to lower acceleration peaks compared to the polynomial trajectory. Reduced accelerations are important for real robots as they decrease mechanical stress, vibration, and energy consumption. The cost value after optimization is significantly lower than that of the polynomial trajectory, confirming improved smoothness. Thus, trajectory optimization produces higher-quality and more realistic robot motion.