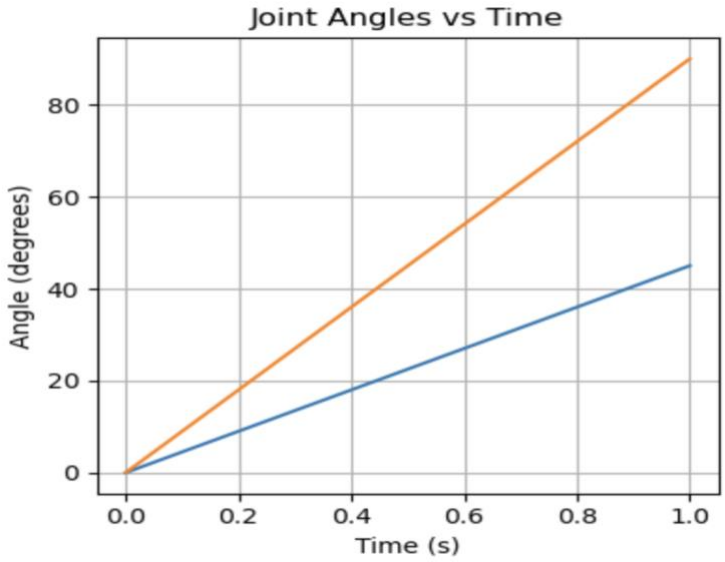
In the given assignment, it was asked to generate joint-space trajectories between two robot configurations and analyse the effect of different trajectory choices on motion smoothness. Two types of trajectories were generated

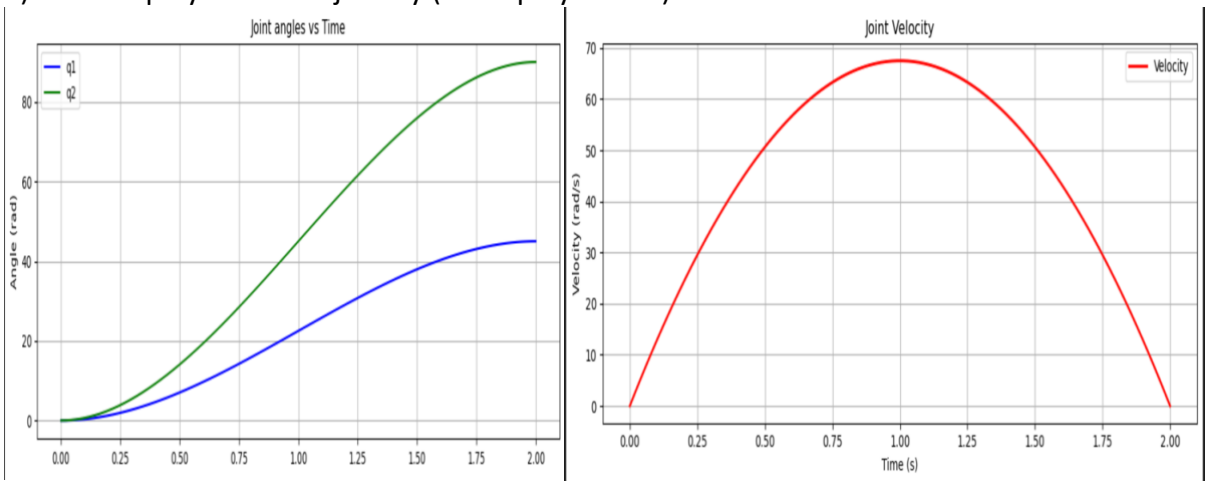
1) Linear joint-space trajectory
2) Smooth polynomial joint-space trajectory (where I used cubic polynomial)

1) Linear joint space trajectory



It's evident from the plot that the joint angles vary linear with time, which results in discontinuous velocity and acceleration profiles, which can lead to jerky motions of the robot and thus more loss of mechanical energy.

2) Smooth polynomial trajectory (cubic polynomial)



The joint angles follow a polynomial relationship with time. From the velocity plot, we can infer that this allows to the velocity to rise up to a certain point and then gradually come to zero arriving at the final state.

Helpfulness of Smooth trajectory: As the velocity of the robot increases and decreases gradually, it prevents jerk for the robot which in turn reduces loss of energy Here, the system sends tiny, gradual updates to the motors every few milliseconds, ensuring the movement follows a continuous curve.