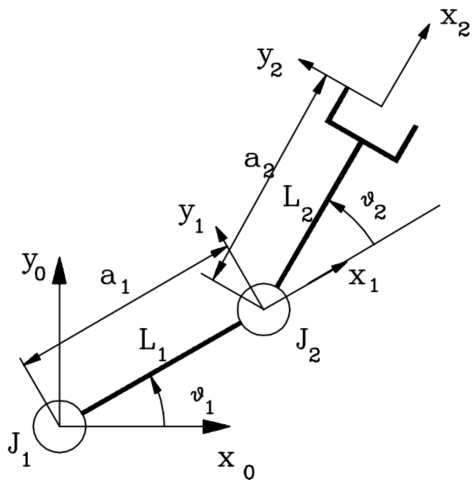
Please do your assignment independently.

Problem 1

Consider the 2D robotic arm with gravity term. However, assume that you have no knowledge of the gravity term.



Let $\mathbf{q} = [q_1, q_2]^\intercal$ where $q_1 = \theta_1$ and $q_2 = \theta_2$. The dynamic model of the system is given by

$$M(\mathbf{q}, \dot{\mathbf{q}})\ddot{\mathbf{q}} + C(\mathbf{q}, \dot{\mathbf{q}})\dot{\mathbf{q}} + N(q) = \tau$$

Using the provided matlab code for a 2d plannar arm manipulator.

- Using augmented PD, resolve the trajectory tracking control (2nd problem in the midterm), using a desired trajectory $q_1(t) = 0.2$ for all $t \geq 0$ and $q_2(t) = \sin 2t$ for all $t \geq 0$.
- Design an iterative learning control that drives the system from any initial state to a desired configuration (at your choice). Hint: Be careful with the gain K_P so that the bound on the gravity term could be satisfied (at least most of the time). Provide your reasoning in a seperate file in addition to your matlab file.