ENPM808M Homework # 4

11/12/2015

WSL

1. Suppose we want a joint space trajectory for the ith revolute joint of a manipulator. The desired trajectory begins at rest at  and ends at .

a. Compute a cubic polynomial satisfying these constraints.

b. Plot the trajectory (the resulting cubic polynomial).

2. Suppose we have a warehouse robot that needs to travel on the floor of the warehouse. The projection of the robot onto the floor is a circle of radius .5 meters. The robot starts with its center at . We want it to move its center to . There are 3 obstacles to avoid. The obstacles project as circles of radius 1 meter on the warehouse floor. The centers of the obstacles are located at .

a. Create an artificial potential function that could be used to find a path suitable path.

b. Suppose that the robot dynamics are simply



Solve for the required  when  kilogram.

3. Describe the configuration space for the three-link manipulator shown in Figure 1.



Figure 1: Three-link planar manipulator.

The distance from the reference to the first rotary joint is 1 meter. The length of the prismatic section is  and the length of the final segment is 5. All these dimensions are in meters.