Homework 1

CSCI 3302 Introduction to Robotics

1. The pictured lawn mower has two mechanical degrees of freedom consisting of its forwards and backwards translation. It has a total of three environmental degrees of freedom consisting of the previous mechanical degrees of freedom along with an angle of rotation, made possible by sliding/skidding. That angular motion makes it possible to mow an entire lawn with rigid wheels. Another way to create angular motion is by lifting the front two wheels off the ground, allowing the mower to rotate on its yaw axis with just the two rear wheels rotating in opposite directions.
2. On an X-Y plane a robot can have at most 6 degrees of freedom; three degrees of translation and three of rotation.
3. (a) The angle between the vectors is 90°.

(b) ?

1. (a)

(b)

(c)

1. Tricycle Forward Kinematics (*derived from Ackermann vehicle forward kinematics*)

