HW 5 4391 Spring 2016 Due March 1

February 23, 2016

Put your answers neatly on separate sheets.

   Do the problems by hand and **check** the results whenever possible. However, you may wish to verify your results with MATLAB solutions to the problems when appropriate.

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We will continue our study of TurtleBot. Read the TurtleBot Guide I
to Page 43 as we covered to page 30 in class.
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Problem 1 40 Points
Read the TurtleBot Guide and write a short essay about the TurtleBot its Nodes and Topics. Describe as best you can what the Nodes and Topics do for the TurtleBot.

Problem 2 20 Points
Find the coordinates of the point $P(5, \sqrt{3})$ after a rotation of $30°$ about the origin.

Problem 3 20 Points
For the three dimensional point in homogeneous coordinates

$$\mathbf{u} = \begin{pmatrix} 1 \\ 2 \\ 3 \\ 1 \end{pmatrix} \tag{1}$$

(a) Rotate it $60°$ around the z-axis and find the coordinates of the rotated point.

(b) Rotate the result in (a) by $-90°$ about the y-axis and find the coordinates of the rotated point.

(c) What is the result if $\mathbf{u}$ is rotated $-90°$ about the y-axis and then rotated $60°$ around the z-axis?

Problem 4
20 points

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Visit the ROS website: http://wiki.ros.org/Robots/TurtleBot
      Choose INDIGO
In the tutorials read the following sections and write a brief summary (30 points)
Bringup
1. PC Bringup Connecting to the turtlebot from the PC.
2. TurtleBot Care and Feeding This tutorials explains how to charge
and maintain your TurtleBot.
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3. Create Odometry and Gyro Calibration - Watch the video and summarize it. (This will show you how to calibrate or test the calibration of a TurtleBot which is highly recommended when running any navigation based application- even though the Kobuki base is factory calibrated, you should test it anyway.