ELEE 4200/5200: Autonomous Mobility Robotics
Term I, 2017
Answers to Homework 3

1.

$$\dot{\xi}_R = \begin{bmatrix} \dot{x_R} \\ \dot{y_R} \\ \dot{\theta_R} \end{bmatrix} = \begin{bmatrix} 7.07 \\ 0 \\ -0.5 \end{bmatrix}$$

Units?

2.

a)

$$v_R = -1.581\ m/s$$

$$v_l = -2.4189\ m/s$$

b)

R= -1.9099 m

c)

t_{60}= 1 s

d)

Same as above!

e)

(ICR_X, ICR_Y)= (4.9549, 4.346)

3.

a)

$$R = \frac{range}{2 * \sin(bearing)} = \frac{r_g}{2sin(\theta_g)} = 70$$

b)

ICC= ?

c)

t_{goal}= 4.188 s

d)

$$\theta = 60^0$$

e)

R= ?

4.

?

5.

a)

$$T = \begin{bmatrix} 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & -7 \\ 1 & 0 & 0 & -4 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

b)

The same as above!

c)

$$\begin{bmatrix} 18 \\ -17 \\ -9 \end{bmatrix}$$

6.

a)

$(x, y)_{predicted}$= (3.9696 m, 4.3473 m)

b)

$(x, y)_{actual}$= (3.9898 m, 4.1741 m)