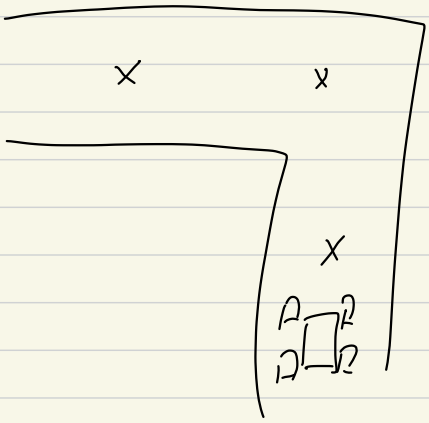
Lab 6.

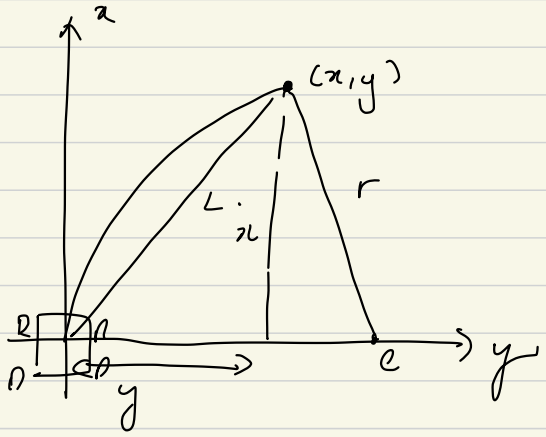


x : waypoint.

① No cartographer

② waypoint - logger
↳ drive around track manually
↳ run logger in background.
* waypoints locations and #

③



$r = y + d$

$d = r - y$

$L^2 = x^2 + y^2$

$d^2 + x^2 = r^2$

$(r-y)^2 + x^2 = r^2$

$r^2 - 2ry + y^2 + x^2 = r^2$

$y^2 - 2ry + x^2 = 0$

$L^2 - 2ry = 0$.

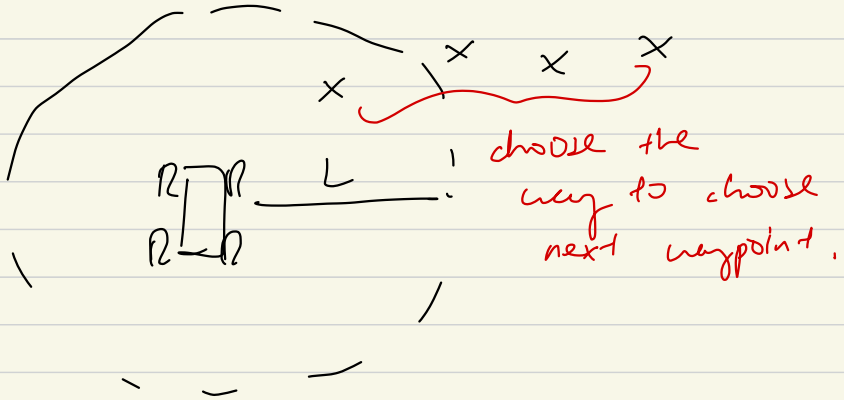
$L^2 = 2ry$

$r = \frac{L^2}{2y}$

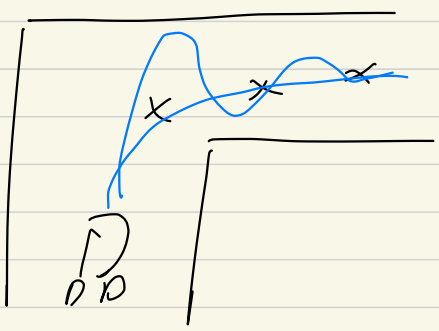
turn ← turn.

$\gamma = k\left(\frac{2y}{L^2}\right)$

④ Other consideration

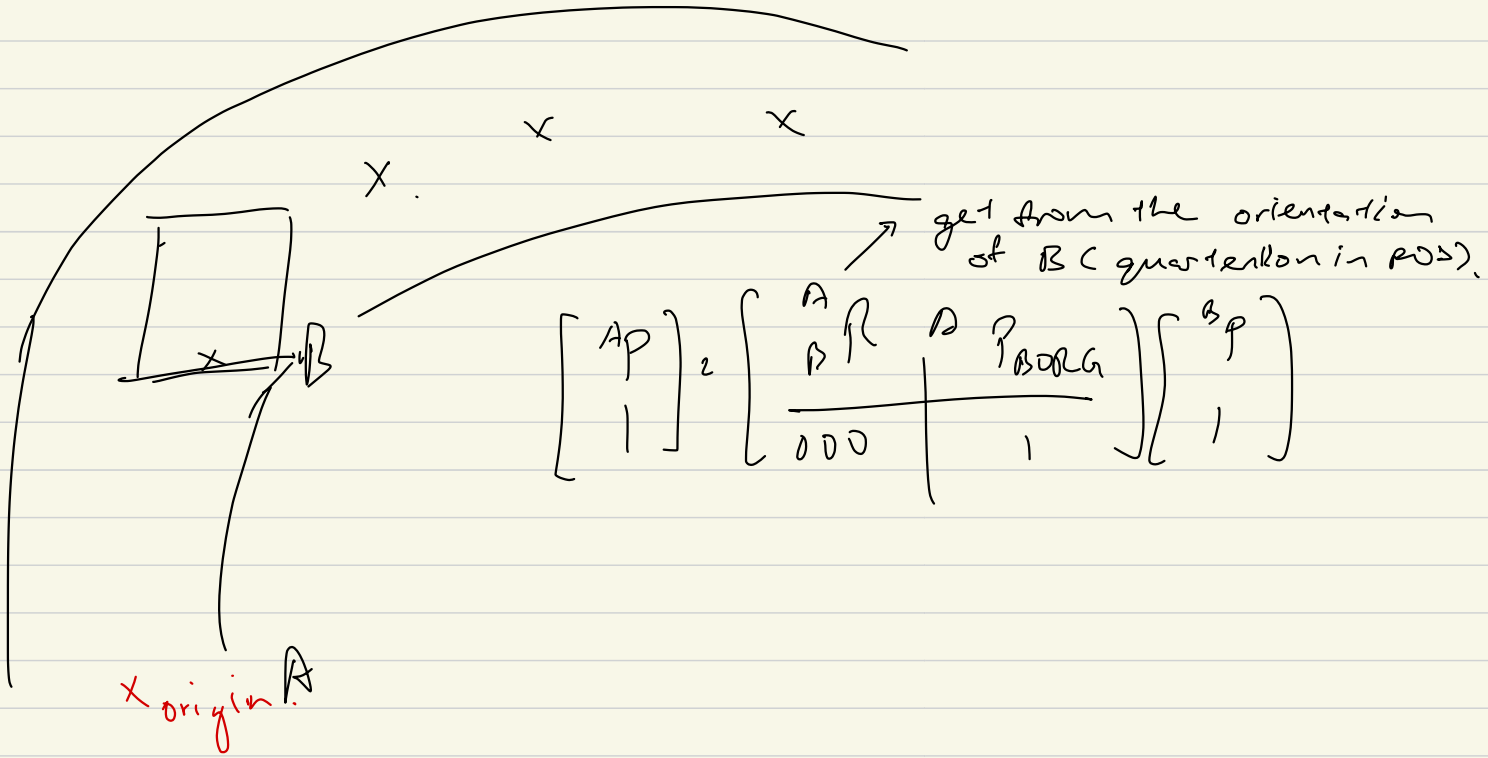


trade off between
- vehicle speed
- distance travelled.



⑤ Visualizing waypoints.

Mapping of point from frame A to B.

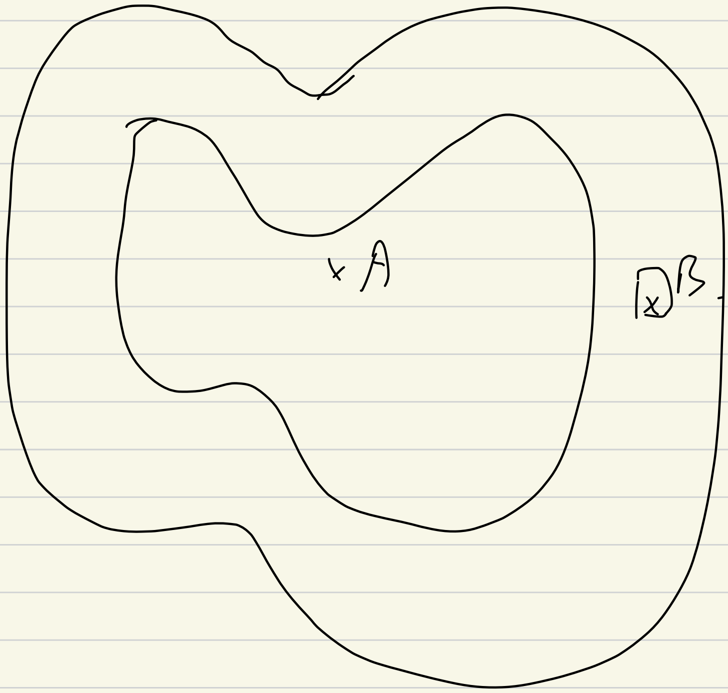



```
cur_matrix = matrix.reshape(3,4)
cur_matrix_homo = np.vstack((cur_matrix, np.array([0, 0, 0, 1]))) # to homogenous coordinates

q = tf.transformations.quaternion_from_matrix(cur_matrix_homo)

p = Pose()
p.position.x = matrix[0][3]
p.position.y = matrix[1][3]
p.position.z = matrix[2][3]
p.orientation.x = q[0]
p.orientation.y = q[1]
p.orientation.z = q[2]
p.orientation.w = q[3]
```

https://answers.ros.org/question/379109/transformation-matrices-to-geometry_msgspose/



$$\begin{bmatrix} {}^{A}P \\ 1 \end{bmatrix} = \begin{bmatrix} {}^{A}_{B}R & {}^{A}P_{BORG} \\ 0 & 1 \end{bmatrix} \begin{bmatrix} {}^{B}P \\ 1 \end{bmatrix}.$$

draft.

4x4 4xn.

do the transformation first.

$$\begin{bmatrix} 0 \\ 1 \\ 2 \\ 3 \end{bmatrix}$$

x = [ ] np.array

y = [ ] np.array

vx = ?

vy = ?

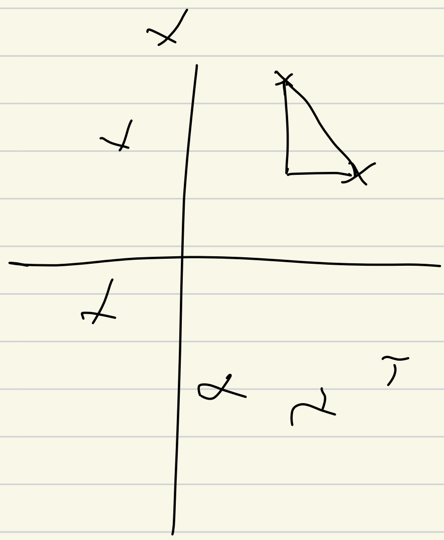
x_diff = $(x - vx)^2$

y_diff = $(y - vy)^2$

L2_dist = sqrt[x_diff + y_diff].

ram.

x [ ]



0 [ ]

get the index

get the L.y.

$\gamma = k\left(\frac{L^2}{2y}\right)$

↙ steering angle.

↑ define k in init.

publish steering angle.