12/2

What to know for Quiz 4

* ever anything on Quiz 1.
* recite the robot model from memory
* Given the Wall-following control

Control law:

$$u_k = u_{nom}$$
$$v_k = k_p(x_k - d_{sep}) + k_d\left(\frac{x_k - x_{k-1}}{\Delta}\right)$$

* compute the fixed-point(s) for the (x, θ) dynamics

$$x_{k+1} = x_k + \Delta u_k \cos(\theta_k)$$
$$\theta_{k+1} = \theta_k + \Delta v_k$$

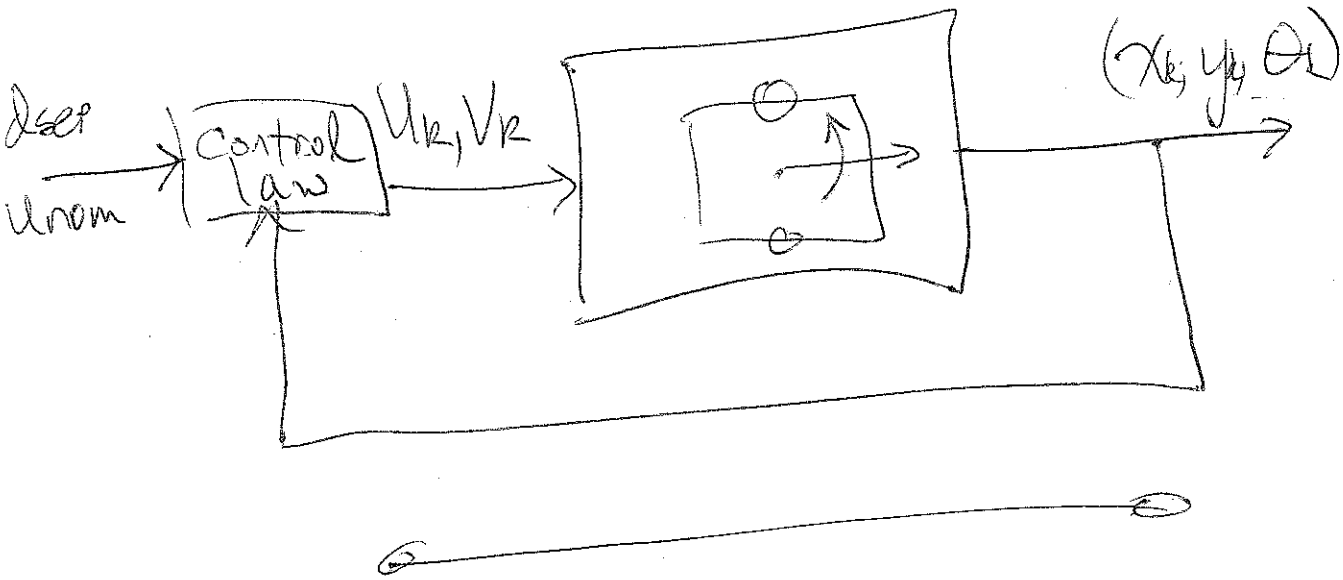
substitute →

$$x_{k+1} = x_k + \Delta u_{nom} \cos(\theta_k)$$
$$\theta_{k+1} = \theta_k + \Delta\left[k_p(x_k - d_{sep}) + \left(\frac{x_k - x_{k-1}}{\Delta}\right)k_d\right]$$

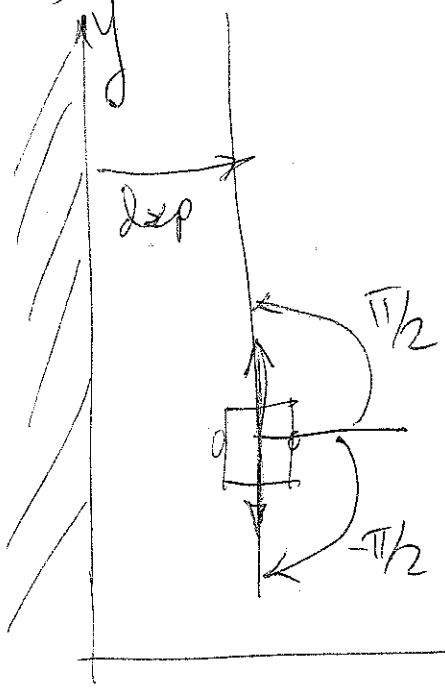
← the closed-loop dynamics

Aside

Block Diagram



Show that for the closed-loop dynamics, $(x_*, \theta_*) = (d_{sep}, \pm \pi/2)$



two fixed points!

(3)

closed-loop y-dynamics

at $\theta_k = \theta_* = \pm \frac{\pi}{2}$

$$y_{k+1} = y_k + \Delta(\pm 1 * u_{nom})$$