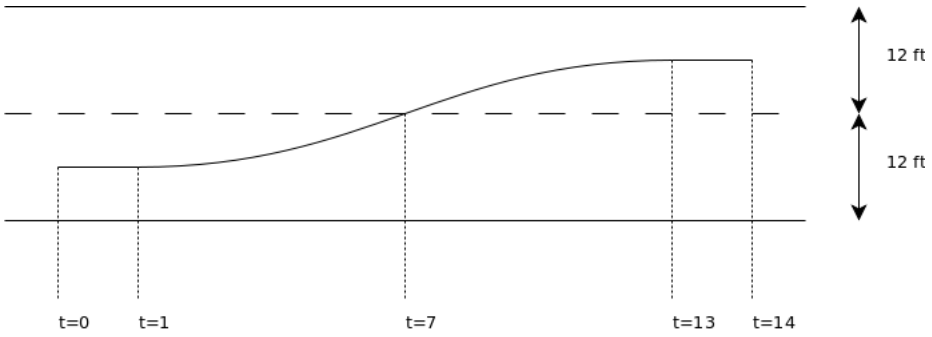
Homework #1

January 10, 2014

System model:

$$\dot{x} = V\cos\theta$$
$$\dot{y} = V\sin\theta$$
$$\dot{\theta} = u$$



$$x(0) = 0 \quad \dot{x}(0) = V$$
$$y(0) = 0 \quad \dot{y}(0) = 0$$
$$\theta(0) = 0 \quad \dot{\theta}(0) = 0$$

Questions:

1. Generate an open loop $u(t)$ and simulate. Plot $x(t)$ and $y(t)$.
2. Keep $u(t)$ constant for a second. Plot $x(t)$ and $y(t)$.
3. Simulate open-loop control with error in x and y.

$$x(k+1) \leftarrow f(x(k), u(k)) + \epsilon_k$$

4. Design a closed-loop controller. Simulate. Plot results.

$$u = K(\theta - \theta_d)$$