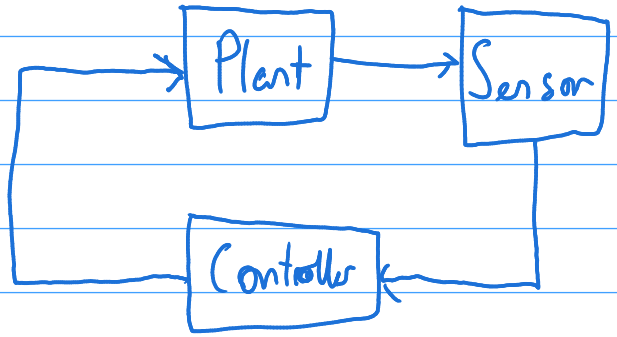
What are the components of a controller?



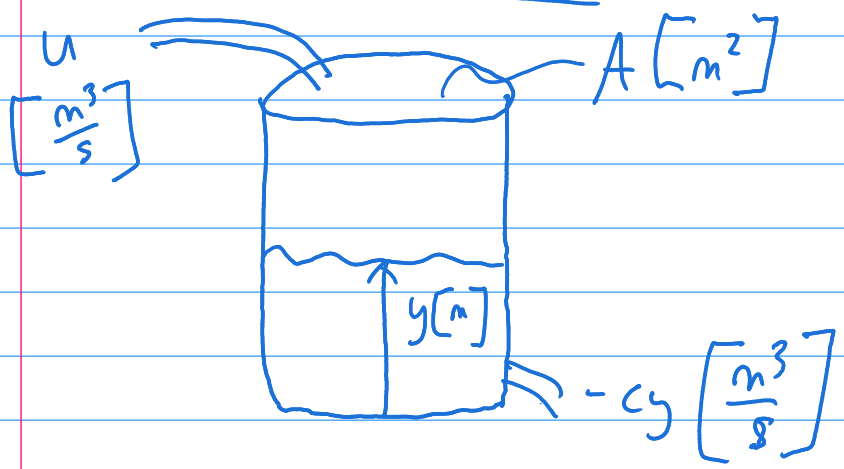
What are the major design criteria of a controller?

- Stability
+ Robustness
- Performance

When is it viable to use an open loop control?

- When enviroment doesn't change / disturbance are measured

Water Tank Example:



Mathematical model

1. $A\frac{dy}{dt} = u - cy$

$\frac{dy}{dt} = \frac{u}{A} - \frac{cy}{A}$ ✓

2. $u = \alpha(\bar{y} - y)$ ✓ Although typically $y - \bar{y}$

3. $\frac{dy}{dt} = \frac{\alpha(\bar{y} - y)}{A} - \frac{cy}{A}$

At $\frac{dy}{dt} = 0 \Rightarrow \alpha\bar{y} - y(\alpha + c) = 0$

$y = \frac{\alpha\bar{y}}{\alpha + c}$

$g(y) = \frac{\alpha(\bar{y} - y)}{A} - \frac{cy}{A}$

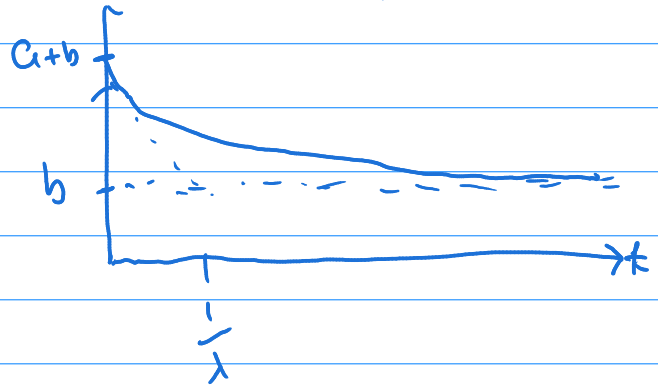
$g'(y) = \frac{-\alpha - c}{A}$

$\boxed{\alpha > -c}$

↳ for stability

4. $\ln(0.01) = -\left(\frac{C}{A} + \frac{\alpha}{A}\right) T$

$$\alpha < \frac{A \ln(0.01)}{T} - C$$



5.