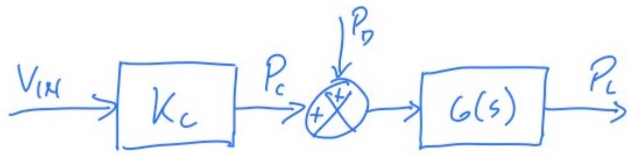
Summary of Lesson 15 main points
BME 444 - Control Systems

1. Open-Loop

An open-loop system with disturbance has this diagram



The formula for the output is

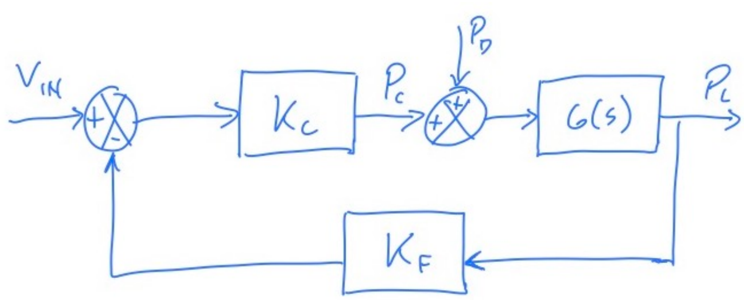
$$P_L(s) = G(s)V_{in}(s)K_C + G(s)P_D(s)$$

For a first-order system, the output equation becomes

$$P_L(s) = \frac{K_C}{\tau s + 1}V_{in}(s) + \frac{1}{\tau s + 1}P_D(s)$$

2. Closed-Loop

A closed-loop system with disturbance has this diagram



The formula for the output is

$$P_L(s) = \frac{G(s)K_C}{1 + G(s)K_CK_F}V_{in}(s) + \frac{G(s)}{1 + G(s)K_CK_F}P_D(s)$$

For a first-order system, the output equation becomes

$$P_L(s) = \frac{K_c}{\tau s + 1 + K_CK_F}V_{in}(s) + \frac{1}{\tau s + 1 + K_CK_F}P_D(s) = \frac{\frac{K_C}{1 + K_CK_F}}{\frac{\tau}{1 + K_CK_F}s + 1}V_{in}(s) + \frac{\frac{1}{1 + K_CK_F}}{\frac{\tau}{1 + K_CK_F}s + 1}P_D(s)$$