

Lec 10

1) Use Euler's method to find the difference equation to program a controller ???

$$D(s) = \frac{U(s)}{E(s)} = K \frac{(s+2)}{(s+0.5)}$$

$$U(s)s + U(s)0.5 = E(s)Ks + E(s)K \cdot 2$$

$$\dot{U}(t) + U(t)0.5 = \dot{e}(t)K + e(t)K \cdot 2$$

Euler's method

$$\left(\frac{U(k+1) - U(k)}{T} \right) + U(k)0.5 = K \left(\frac{e(k+1) - e(k)}{T} \right) + e(k)K \cdot 2$$

$$U(k+1) - U(k) + U(k)0.5T = K(e(k+1) - e(k)) + e(k)K \cdot 2 \cdot T$$

$$U(k+1) = U(k) - U(k)0.5T + K(e(k+1) - e(k)) + e(k)K \cdot 2 \cdot T$$

$$U(k+1) = (1 - 0.5T)U(k) + K(e(k+1) + e(k)(2T - 1))$$

send code: "

$$x = 0$$

$$K = \text{gain}$$

$$C_1 = 1 - 0.5T$$

$$C_2 = K(2T - 1)$$

Read r and y from the A/D converter

$$e = r - y$$

$$u = x + Ke$$

Send u to the D/A converter

$$x = C_1 u + C_2 e \quad (\text{update } x \text{ for next run through the loop})$$

Wait until T seconds from last read