Computerized control - partial exam 1

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Problem 1

Consider the continuous-time system with the transfer function

$$G(s) = \frac{2}{s+2}$$

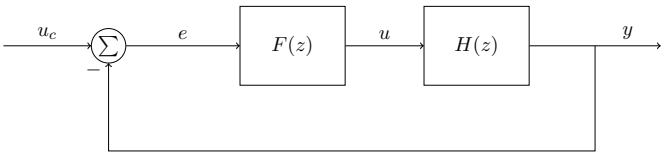
The system is sampled with sampling interval h using zero-order hold. **Show that the pulse-transfer function for the sampled system is**

$$H(z) = \frac{1 - \mathrm{e}^{-2h}}{z - \mathrm{e}^{-2h}}.$$

Problem 2

The sampled system in Problem 1 is controlled using the discrete-time controller

$$F(z) = 1 + \frac{1}{2(z-1)} = \frac{2z-1}{z-1}.$$



1. **Calculate the pulse-transfer function** of the closed-loop system from $u_c(kh)$ to $y(kh)$.
2. Let $h = \frac{\ln 2}{2} \approx 0.35$. **Is the closed-loop system stable?**