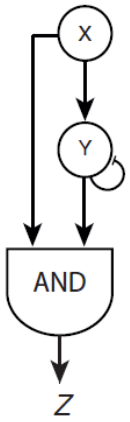
Assignment 1

1. The regulator Y in coherent FFLs is often negatively auto-regulated. How does this affect the dynamics of the circuit, assuming that it has an AND input function at the Z promoter? Consider both an ON step and an OFF step.



2. Show that the response time can vary with n (hill coefficient) for negative autoregulation. Derive! (Use the approximation of strong autorepression). Would changing 'n' make the system robust to fluctuations in production rate?

3. For the following equation:

$$\frac{dx}{dt} = \beta' + \beta.x - \alpha.x$$

Solve for the response time. Compare with simple regulation.