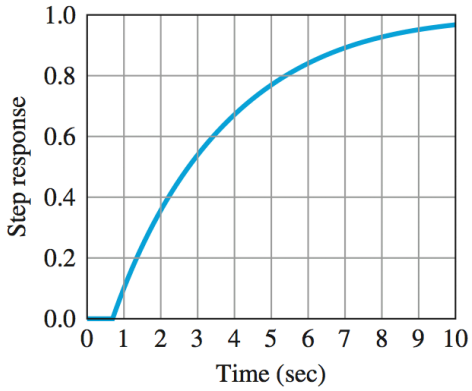
Control Systems : Set 3 : PID (2)

Prob 1 | The unit-step response of a paper machine is shown in the figure below, where the input to the system is stock flow onto the wire and the output is the basis weight of the paper (i.e., the thickness). Find the proportional, PI, and PID-controller parameters using the Ziegler-Nichols method.



Prob 2 | A system has the transfer function

$$G(s) = \frac{e^{-2s}}{3s+1}$$

Find the PID-controller parameters using the Ziegler-Nichols tuning rules.
Hint: The maximum slope of a first-order system is given by the inverse of the time constant.

Prob 3 | Using proportional feedback control, control designers have obtained a closed-loop system with the unit impulse response shown in the figure below. When the gain is $K_{pc} = 8.556$, the system is on the verge of instability. Determine the proportional-, PI-, and PID-controller parameters according to the Ziegler-Nichols method.