Exercise 1

Obtain the small signal transfer function $\frac{\tilde{v}_o(s)}{\tilde{d}(s)}$ of a Flyback-converter working in continuous conduction mode (CCM). $\tilde{v}_0$ is the small perturbation in the output signal $v_o(t)$ and $\tilde{d}$ is the small perturbation in the switch duty ration $d(t)$. For the sake of simplicity, the ratio of the transformer $N1/N2 = 1$ and the components are assumed to be ideal.
Draw the Bode-diagram when $V_d = 24$V, $V_o = 12$V and the resistance of the load is $R = 5\Omega$. The switching frequency is $f_s = 200$kHz and the values of the components are $L = 10\mu H$ and $C = 100\mu$F.

Exercise 2

Obtain the transfer function $\frac{\tilde{v}_o(s)}{\tilde{d}_1(s)}$ of a flyback converter working in discontinuous conduction mode (DCM). It is assumed that in the converter is with a feedback loop. The rest of the values are in the previous exercise. What is the value of R that set the converter working at the limit of CCM and DCM? Draw the Bode diagram when the resistive load $R = 15\Omega$.