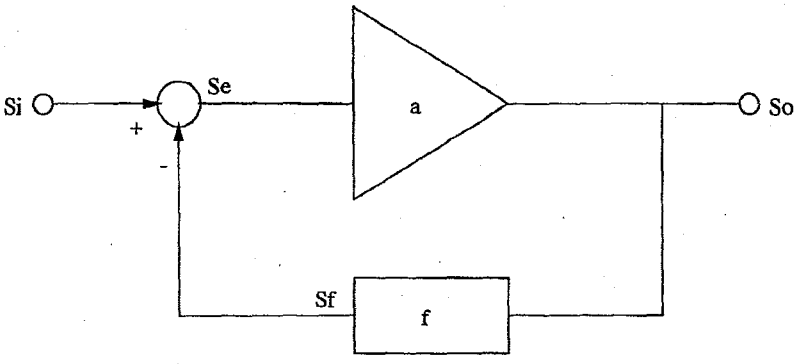
Problem 3



Consider this idealized feedback configuration.

(a) Please derive an expression for the closed-loop gain (A).

(b) Please derive an expression for the closed-loop 3dB frequency ($\omega_{3dB,CL}$) when the basic amplifier (a) is now modeled as a one pole system:

$$a(s) = \frac{a_o}{1 + \frac{s}{\omega_{3dB}}}$$

where a_o is the open-loop DC gain and ω_{3dB} is the 3dB open-loop frequency.

(c) Does the addition of feedback increase the gain-bandwidth product? Why or why not?

Problem 4

Please describe the major sub-circuits of an op-amp, and the critical design considerations of each.