1) Calculate $V_{out}$ in terms of $V_{in}$ for the following ideal Op-Amp.

![Op-Amp Diagram]

2) Calculate the amplification as a function of frequency for the following ideal Op-Amp.

![Op-Amp Diagram]

3) Calculate the input resistance of the circuit below and show that the circuit behaves like a negative resistance.

![Circuit Diagram]

4) For the circuit below show that the output $V_{out}$ is proportional the square root of the input $V_{in}$.

![Circuit Diagram]
5) Design an ideal Op-Amp circuit that will produce an output $V_{out}$ proportional to the square of the input $V_{in}$. 