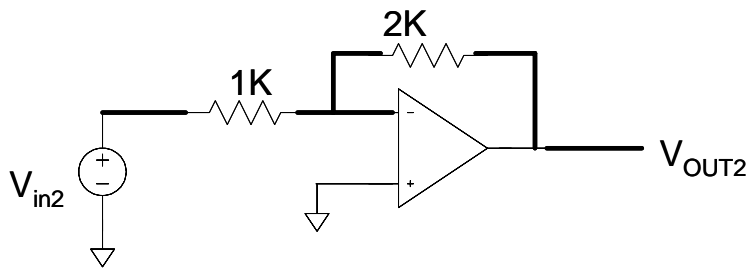
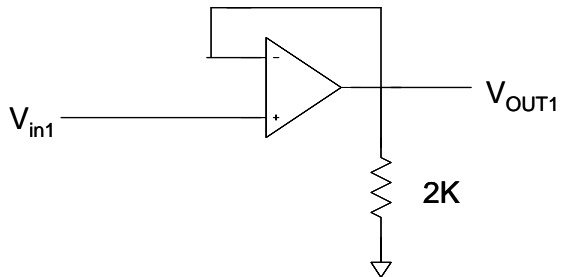


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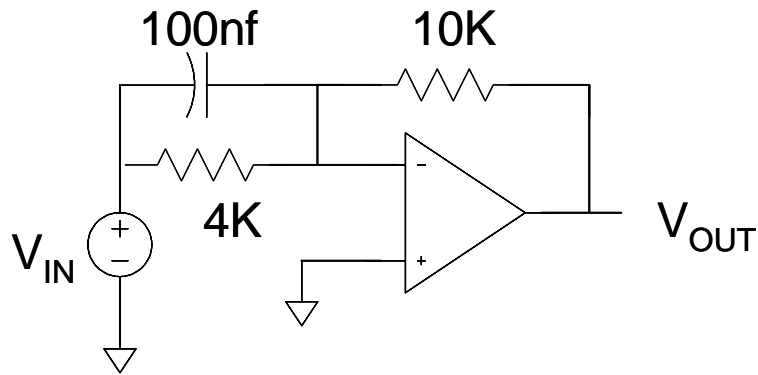
Name _____

Instructions: The points allocated to each problem are as indicated. All work and answers should be written on the exam sheet itself. Unless specifically stated to the contrary, assume all operational amplifiers are ideal.

Problem 1 (15 pts). Determine the 3dB bandwidth in Hz. of the amplifiers shown. Assume the GB of the op amps is 2.5MHz.

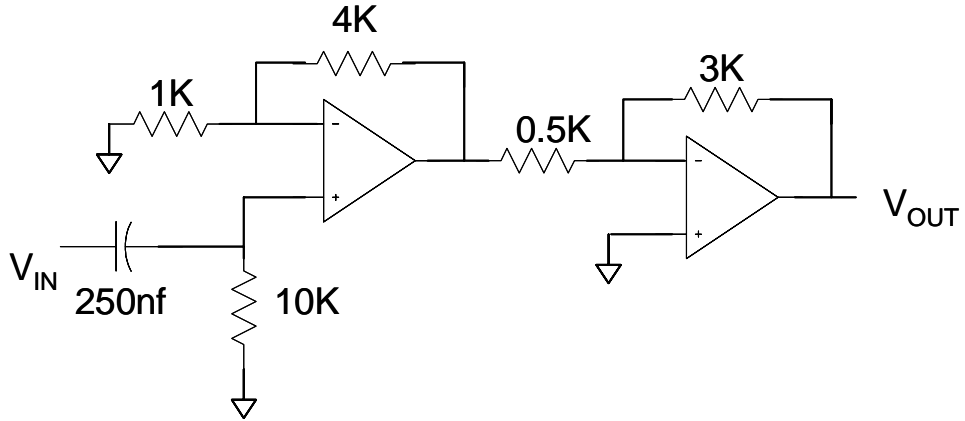


Problem 2 (15 pts) Determine the steady state output for the amplifier shown if the input is $V_{IN} = 0.4\sin(500t + 35^\circ)$.



Problem 3 (15 points)

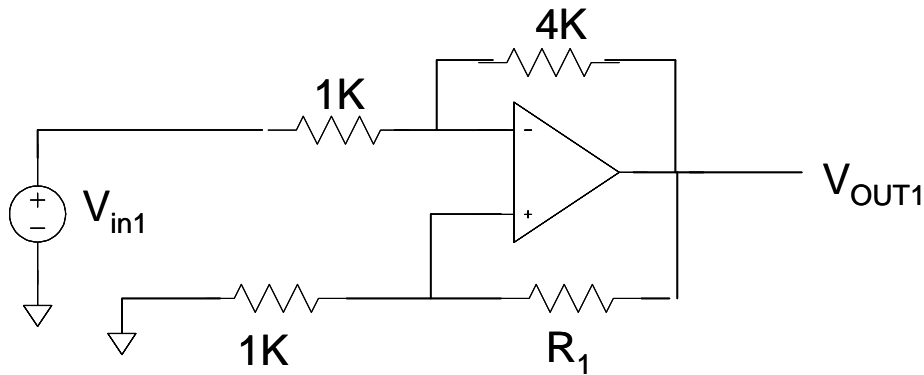
Determine the poles for the following voltage amplifier and the response of the amplifier if a 0.25V step is applied to the input at $t=0$.



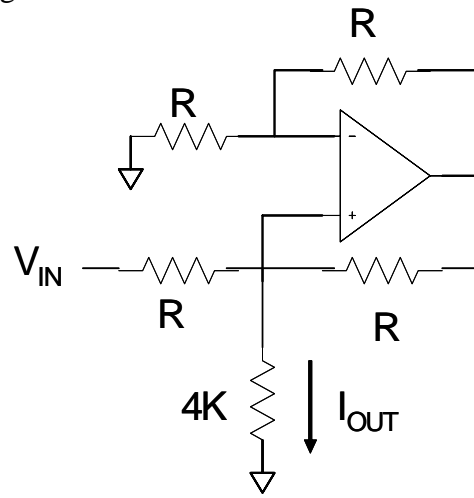
Problem 4 (15 pts)

a) Determine the output voltage for the following circuit if $R_1=2K$ and the Op Amp is ideal.

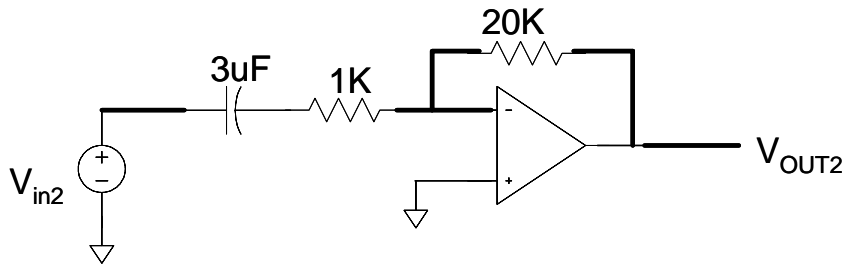
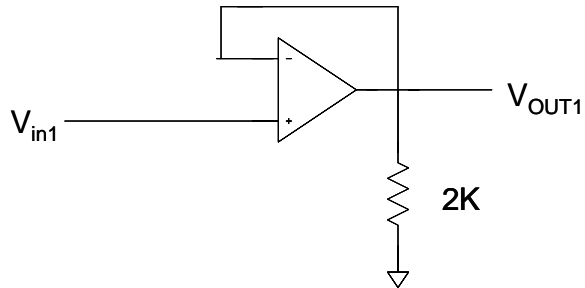
b) Assume the operational amplifier has a dc gain of 5000 and a pole at -20 rad/sec. Determine the minimum value for R_1 that will make the following amplifier stable.



Problem 5 (15 pts) Obtain I_{OUT} for the following circuit.



Problem 6 (15 pts) Assume the operational amplifiers have an input-referred offset voltage that is anywhere between -3mV and 3mV . Determine the worst case output offset due to the input offset voltage and the dc voltage gain for the amplifiers shown.



Problem 7 (10 pts) Design a circuit that has an output voltage given by the expression $V_{\text{OUT}} = V_1 - 2V_2 + \frac{0.1V_4}{s}$. Assume you have available ideal op amps, resistors, capacitors and ideal voltage sources.