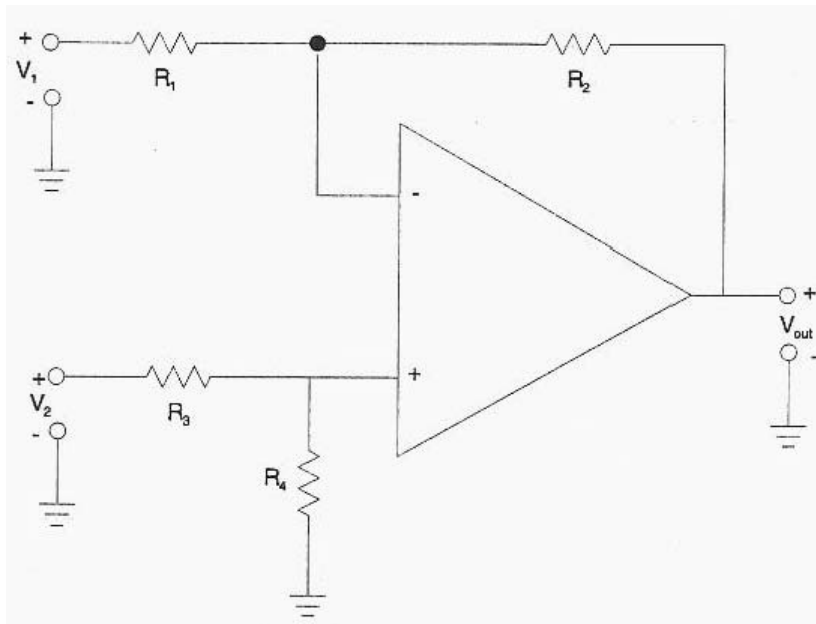


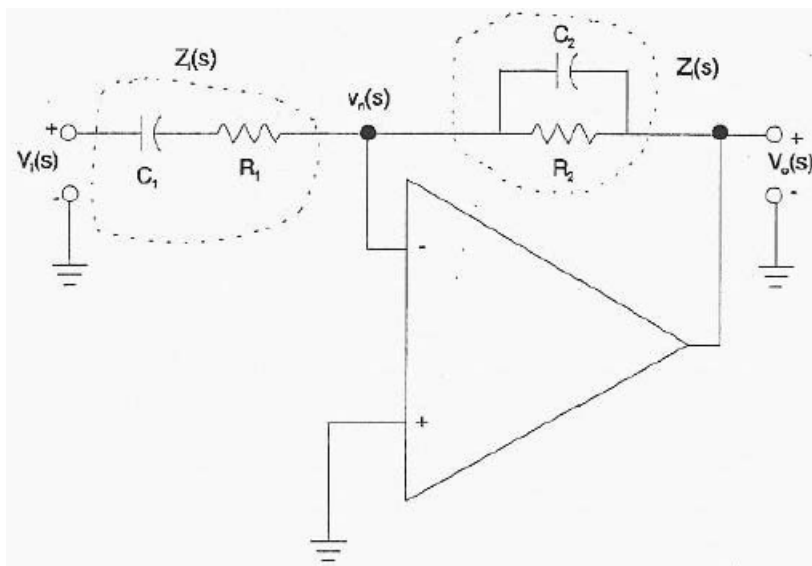
Introduction to Biomedical Engineering

Homework on instrumentation. Due 1/8/2007

1. For the following circuit shown in slide 17 of the lecture



- (a) In the above differential amplifier (slide 17 of lecture), derive the expression for $G_d = V_{out}/V_d$ where a differential input $V_d = V_2 - V_1$. Hint: use $V_{cm} = (V_1 + V_2)/2$ and express V_1 and V_2 in terms of V_{cm} and V_d .
 - (b) Simulate the CMRR, preferably for more than 10 times. Use resistance of $100\text{K}\Omega \pm 1\%$ for R_1 - R_4 . Assume the error in resistance is a random number that has a uniform distribution.
2. For the following circuit shown in slide 25 of the lecture



- (a) In slide 31 of lecture, find out the cut-off frequencies corresponding to ω_1 and ω_2 , respectively.
- (b) What modifications can you do to make a band-stop filter?