

Circuits II

EE221

Unit 7

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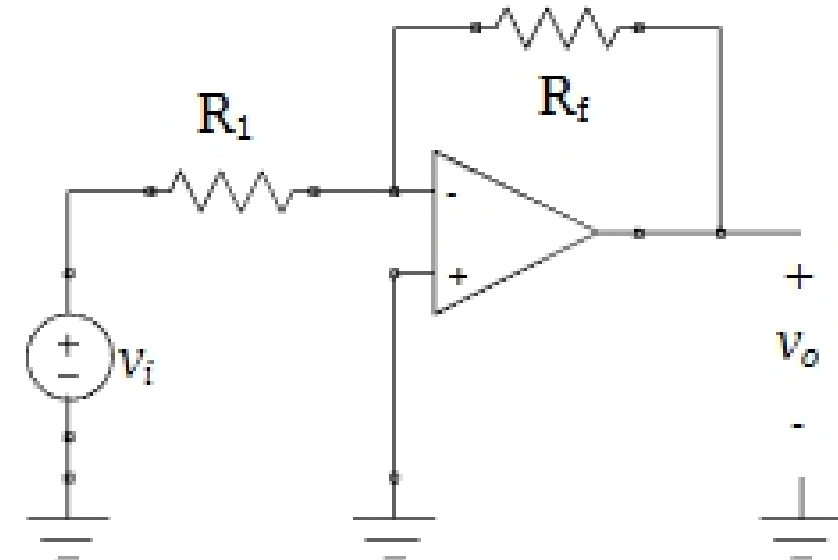
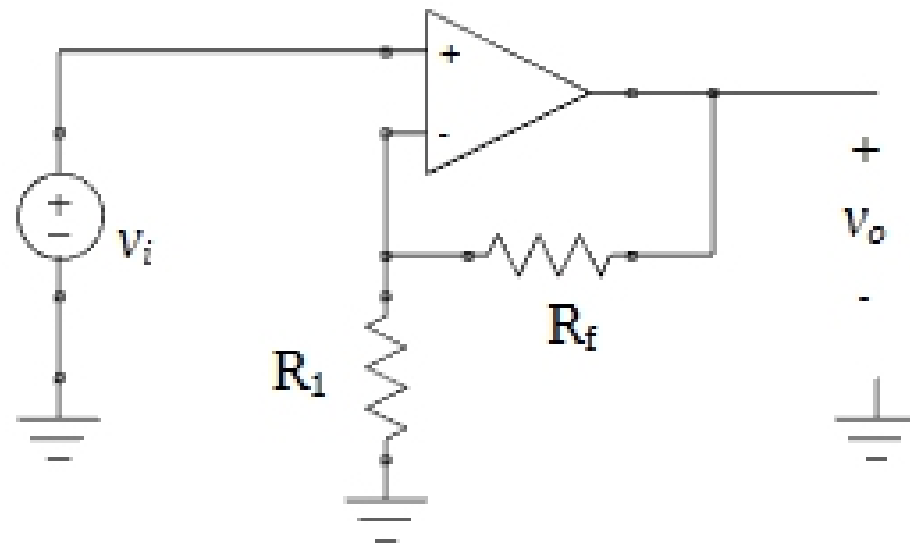
Active Filters, Connections of Filters, and
Midterm Project

Useful Circuits:

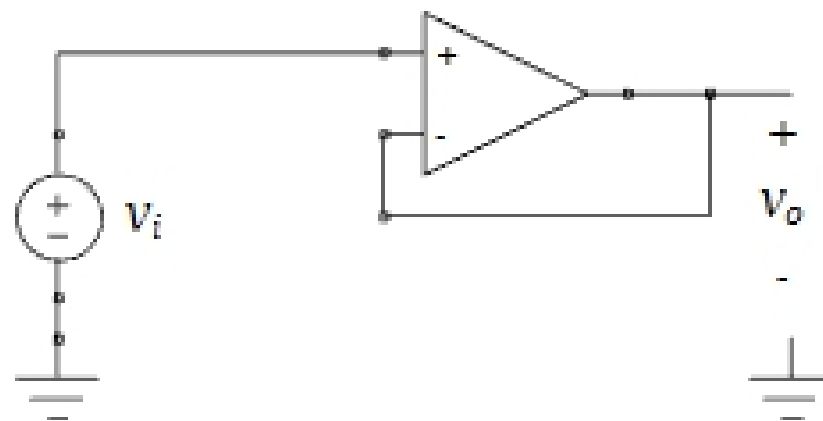
Describe the transfer functions of these circuits:

Non-Inverting Op Amp: gain = $(1 + R_f / R_1)$

Inverting Op Amp: gain = $(- R_f / R_1)$



Voltage Follower: gain = 1

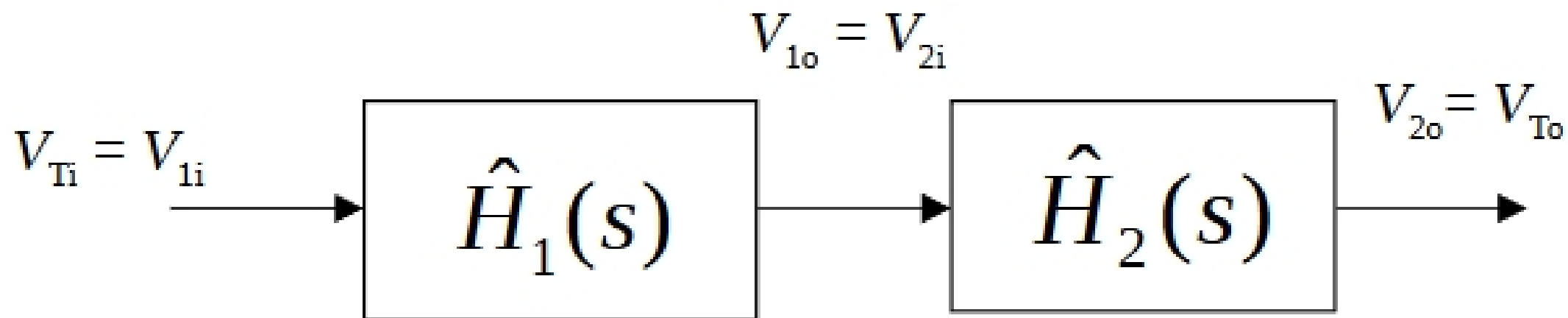


Cascading Filter Stages: no Loading Effects:

Given two active filter circuits with transfer functions $\hat{H}_1(s)$ and $\hat{H}_2(s)$ their series combination has a transfer function equal to the product of the individual transfer functions:

$$\hat{H}_T(s) = \hat{H}_1(s)\hat{H}_2(s)$$

provided that the connection between these circuits does not significantly alter the output resistance of the first circuit or the input resistance of the second circuit (i.e. no loading effects).



$$\hat{H}_T(s) = \frac{\hat{V}_{To}}{\hat{V}_{Ti}} = \left[\frac{\hat{V}_{1o}}{\hat{V}_{1i}} \right] \left[\frac{\hat{V}_{2o}}{\hat{V}_{2i}} \right] = \hat{H}_1(s)\hat{H}_2(s)$$

Homework (1): In Matlab create bode plots for a first-order high-pass filter (with $G_\infty = 2$ and $f_c = 1$ kHz) in series with a second order band-reject filter (with $f_0 = 5000$ Hz, $B = 500$ Hz, and $G_{DC} = G_\infty = 1$).