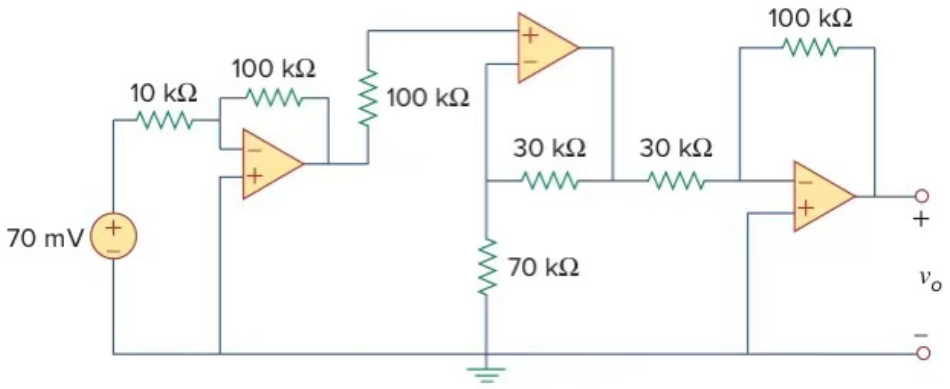
VE215 2022Fall Assignment 3

Due Date: 23:59, October 30th, 2022

Exercise 3.1 (30%)
Find v_o in the following op amp circuit.



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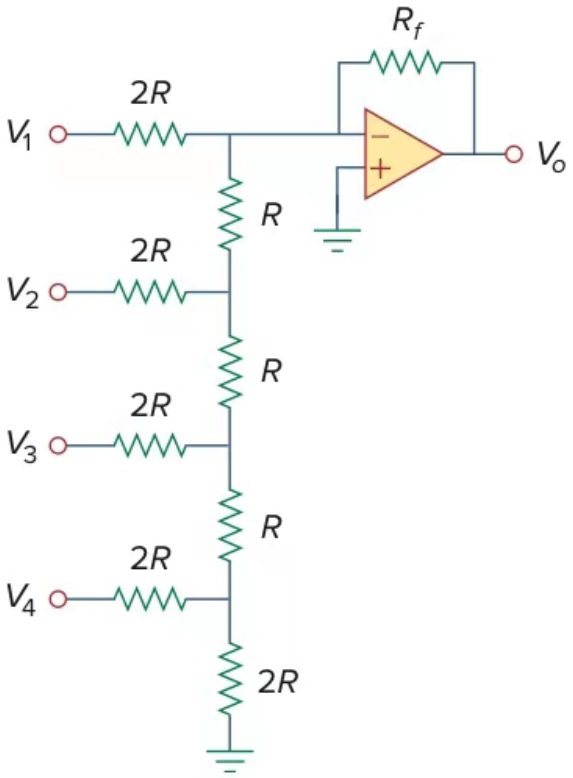
Exercise 3.2 (30%)
A four-bit $R-2R$ ladder digital-to-analog converter is shown below.
(a) (15%) Show that the output voltage is given by

$$-V_o = R_f(\frac{V_1}{2R} + \frac{V_2}{4R} + \frac{V_3}{8R} + \frac{V_4}{16R})$$

(b) (15%) if $R_f = 12k\Omega$ and $R = 10k\Omega$, find $|V_o|$ for $[V_1V_2V_3V_4]$=[1001] and $[V_1V_2V_3V_4]$=[1010].



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Exercise 3.3 (20%)
The voltage across a 50-mH inductor is given by

$$v(t) = [5e^{-2t} + 2t + 4]V$$

for $t > 0$.
Determine the current $i(t)$ through the inductor. Assume that $i(0) = 0$A.

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Exercise 3.4 (20%)
Find L_{eq} at the terminals of the following circuit.