VE215 2023Su Assignment 4

Due Date: 23:59, June 20th, 2023

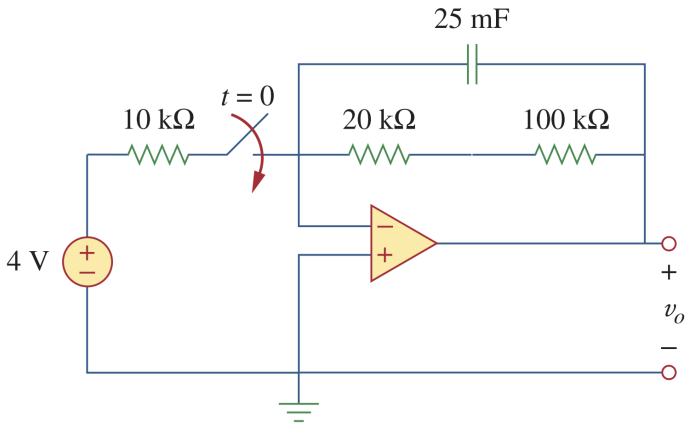
In order to get full marks, you shall write all the intermediate steps of calculation or proof unless otherwise indicated.

Exercise 4.1 (25%)

The following figure shows a op-amp circuit. The switch is closed at $t = 0$.

(a) (10%) Derive the differential equation that relates to the output voltage v_o.

(b) (15%) Derive $v_o(t)$ of $t > 0$.



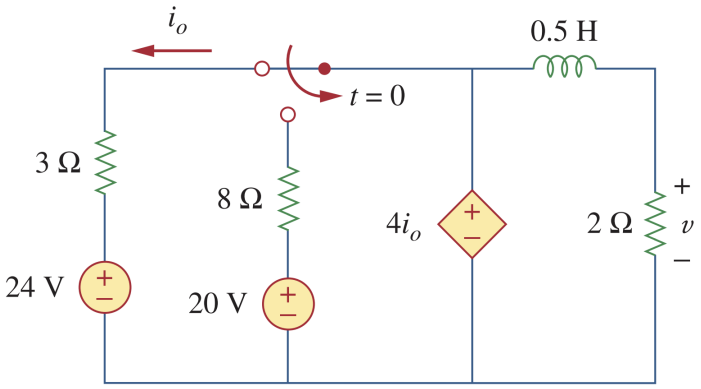
VE215 2023Su Assignment 4

Exercise 4.2 (25%)

For the op-amp circuit shown below, the switch is connected to the branch connected with a 3Ω resister and a 24V independent voltage source at $t < 0$, and it is switched to the branch connected with a 8Ω resister and a 20V independent voltage source at $t \geq 0$.

(a) (10%) Find $v(t)$ for $t < 0$.

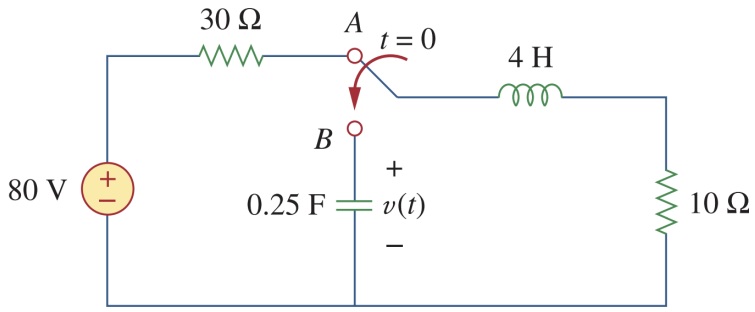
(b) (15%) Find $v(t)$ for $t \geq 0$.



VE215 2023Su Assignment 4

Exercise 4.3 (20%)

The switch in the following figure moves form position A to position B at $t = 0$ (please note that the switch must connect to point B before it breaks the connection at A, a make-before-break switch). Let $v(0) = 0\text{V}$, find $v(t)$ for $t > 0$.



VE215 2023Su Assignment 4

Exercise 4.4 (30%)

The input current source of the following circuit is $2(1-u(t))$A. Please find $i(t)$ for $t>0$.