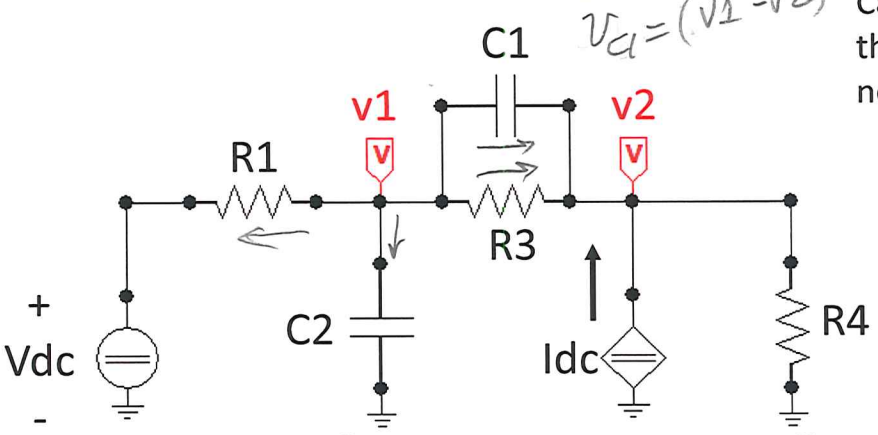
Name:_____

ELC 2320 Test 3, 2021_0312



$V_{C1} = (V1 - V2)$

Carefully write the KCL equations for v1 and v2 below, and them place them into the organized matrix form on the next page.

For Node 1

$$\frac{V_1 - V_{dc}}{R1} + C_1 \frac{d}{dt}(V1 - V2) + \frac{V_1 - V_2}{R3} + C_2 \frac{dV_1}{dt} = 0$$

$$V_1\left[\frac{1}{R_1} + \frac{1}{R3}\right] + V_2\left[\frac{-1}{R3}\right] + \frac{dV_1}{dt}\left[C_1 + C_2\right] + \frac{dV_2}{dt}\left[-C1\right] - \frac{V_{dc}}{R1} = 0$$

For Node 2

$$\frac{V_2 - V_1}{R3} + C1 \frac{d}{dt}(V_2 - V_1) + \frac{V_2}{R4} - I_{dc} = 0$$

$V_1\left[-\frac{1}{R3}\right]$

$V_2\left[\frac{1}{R3} + \frac{1}{R4}\right]$

$\frac{dV_1}{dt}\left[-C1\right]$

$\frac{dV_2}{dt}\left[C1\right]$

Name: _____

Initial Conditions & Final Conditions

If $\frac{dv_1}{dt} = 0$, and $\frac{dv_2}{dt} = 0$

$$\left(\frac{1}{R_1} + \frac{1}{R_2}\right)V1 - \frac{1}{R_3}(V2) = \frac{V_{dc}}{R_1}$$

$$-\frac{1}{R_3}V1 + \left(\frac{1}{R_3} + \frac{1}{R_4}\right)V2 = I_{dc}$$

$\frac{1}{R1} + \frac{1}{R3}$	$-\frac{1}{R3}$	$C_1 + C_2$	$-C_1$	v1	=	$\frac{V_{dc}}{R1}$
$-\frac{1}{R3}$	$\frac{1}{R3} + \frac{1}{R4}$	$-C_1$	C_1	v2	=	I_{dc}
				dv1/dt	=	
				dv2/dt	=	