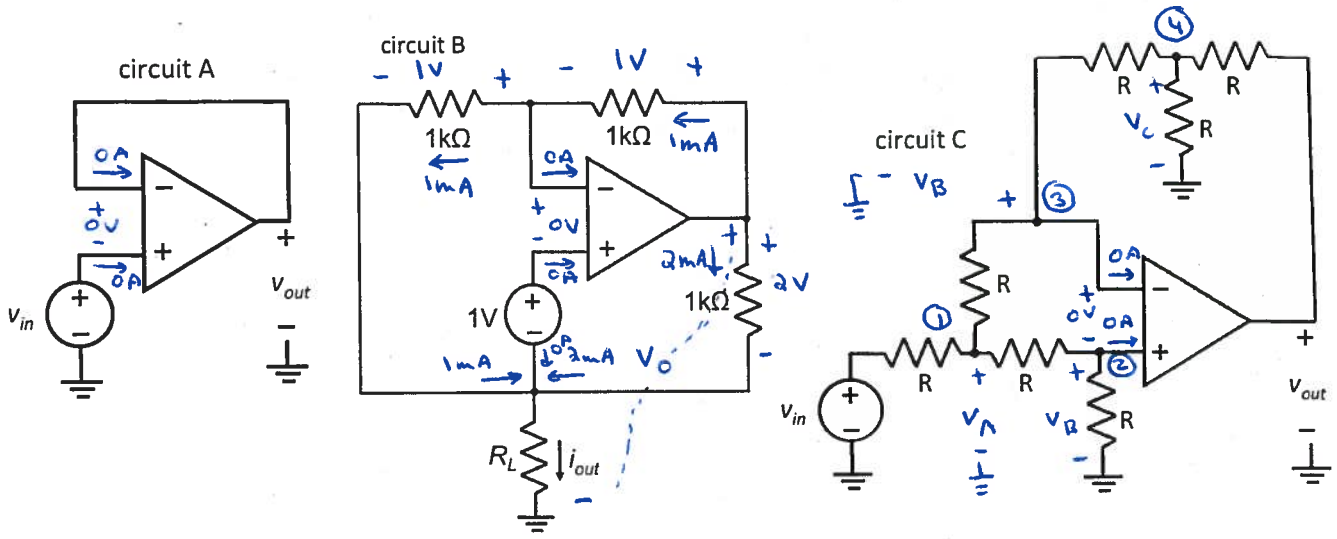
ECSE-200 Quiz # 8 (10_2 Nov 2018)

NAME_____ McGill ID#_____

READ each question carefully. Do your work independently. SHOW ALL YOUR WORK. Give units on your answers (where appropriate).



1) Consider circuit A. Assuming ideal op-amp behaviour, what is v_{out} / v_{in} ? [2pts]

2) Consider circuit B. Assuming ideal op-amp behaviour, what is the value of the current i_{out} ? [1pt]

3) Consider circuit B. If the op-amp circuit power supplies are at +15V and -15V, at what positive value of R_L will the op-amp circuit be on the threshold between linear and saturated operation? [1pt]

4) Consider circuit C. Assuming ideal op-amp behaviour, what is v_{out} / v_{in} ? [1pt]

1) $v_{out} / v_{in} = 1$ [+2]

2) $i_{out} = 1mA + 2mA = 3mA$ [+1]

3) $v_o = 3mA \cdot R_L + 2V$ if $v_o = +15V$ then $R_L = \frac{13V}{3mA} = 4.333k\Omega$ [+1]

4) ① $0 = \frac{v_A - v_{in}}{R} + \frac{v_A - v_B}{R} + \frac{v_A - v_B}{R}$ $v_A = \frac{1}{3} v_{in} + \frac{2}{3} v_B$

② $0 = \frac{v_B - v_A}{R} + \frac{v_B}{R}$ $v_B = \frac{1}{2} v_A$ → $v_A = \frac{1}{2} v_{in}$ $v_B = \frac{1}{4} v_{in}$

③ $0 = \frac{v_B - v_A}{R} + \frac{v_B - v_C}{R}$ $v_C = 2v_B - v_A = 0V$

④ $0 = \frac{v_C - v_B}{R} + \frac{v_C}{R} + \frac{v_C - v_{out}}{R}$ $v_{out} = 3v_C - v_B = -\frac{1}{4} v_{in}$

$\frac{v_{out}}{v_{in}} = -\frac{1}{4}$ [+1]