Student name: ID Number:

ECE 2EI4 Quiz 1

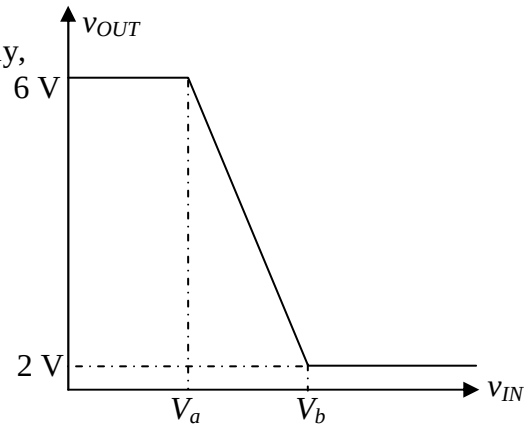
1) An 8 bit analog to digital converter has a reference voltage of V_{ref} =10.24 V. If the input voltage is 3.34 V, the corresponding output word and the sign of the quantization error are
a) 01010010, +ve b) 01010100, +ve c) 01010100, -ve d) 01010010, -ve
e) 01010101, +ve

2) The frequency expression of a low-pass voltage amplifier with a mid-band gain of 40 dB and a cut-off frequency of 5 MHz is

a) $\frac{10^8 \pi s}{(s+10^7\pi)}$ b) $\frac{10^8 \pi}{(s+10^7\pi)}$ c) $\frac{100}{(s+10^7\pi)}$ d) $\frac{10^9 \pi}{(s+10^7\pi)}$ e) $\frac{40}{(s+10^7\pi)}$

3) The figure to the right shows the transfer function of a voltage amplifier. What are the values of V_a and V_b, respectively, such that the amplifier has a maximum gain of 32 dB and can linearly amplify ac signals with amplitudes up to 0.05 V without distortion?

a) 0.2 V, 0.35 V
b) 0.2 V, 0.3 V
c) 0.2 V, 0.25 V
d) 0.25 V, 0.3 V
e) 0.05 V, 0.10 V

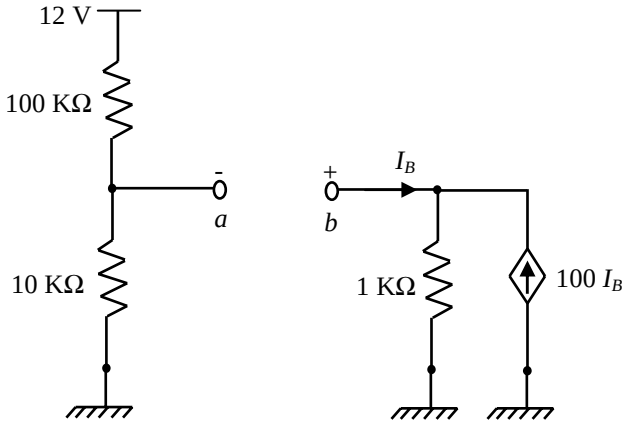


4) We have to choose an appropriate amplifier for a sensor application. The input voltage is 1.0 mV in series with a source resistance of 50 KΩ. To obtain $v_{ID} \geq 0.99\,\text{mV}$, the input resistance of the amplifier should satisfy

a) $R_{ID} \leq 4.95\,\text{M}\Omega$ b) $R_{ID} \leq 5\,\text{M}\Omega$ c) $R_{ID} \geq 6\,\text{G}\Omega$
d) $R_{ID} \geq 5\,\text{M}\Omega$ e) $R_{ID} \geq 4.95\,\text{M}\Omega$

5) The Thevenin's equivalent voltage and resistance seen between point *a* and point *b* are approximately

a) 1.09 V, 111 KΩ
b) 1.09 V, 12.1 KΩ
c) 0.12 V, 120 KΩ
d) 0.12 V, 11 KΩ
e) 10.9 V, 99 KΩ

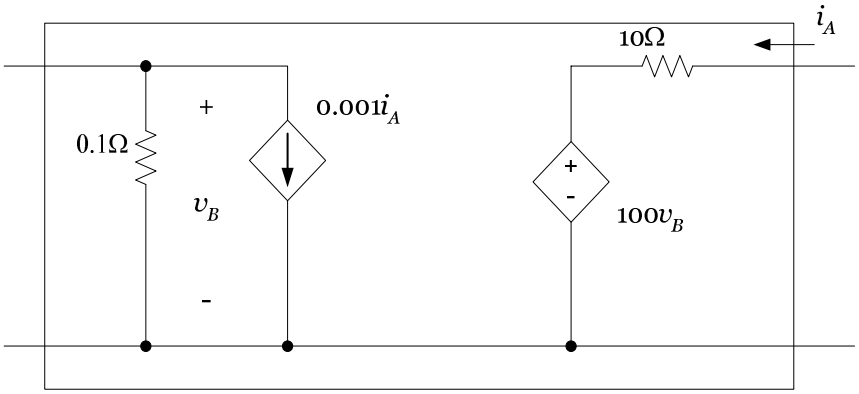


Student name: ID Number:

6) The g-parameter representation of a two port network is given by:

$$i_1 = g_{11}v_1 + g_{12}i_2$$
$$v_2 = g_{21}v_1 + g_{22}i_2$$

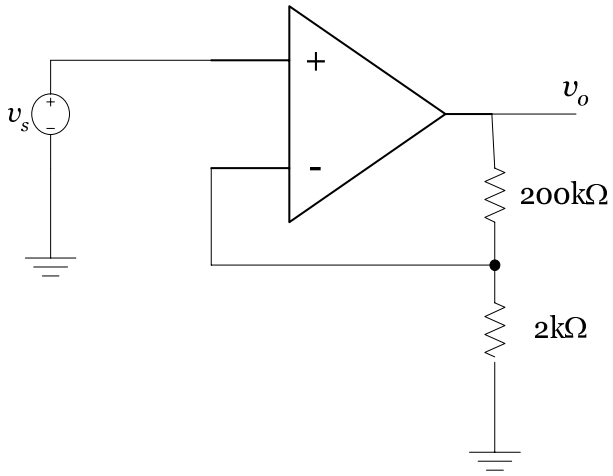
What is g_{21} for the shown circuit?



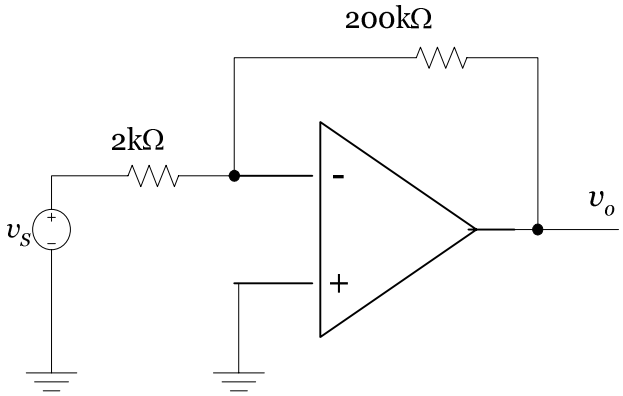
a) 100 V/V b) 10 Ohm c) 10 S
d) 0.001 A/A e) 0.1 Ohm

7) You are asked to design an amplifier with input resistance ≥ 20k and a negative gain with amplitude of 100. Which of the designs below meets these criteria?

a)

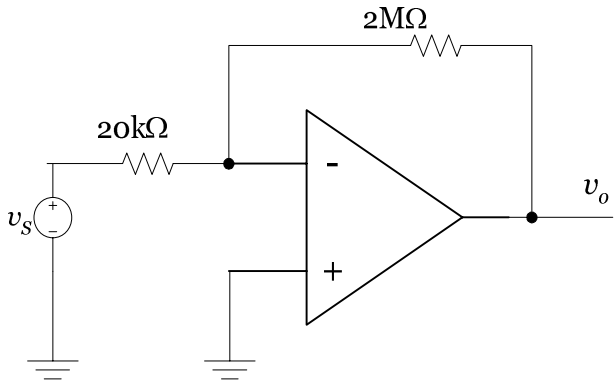


b)

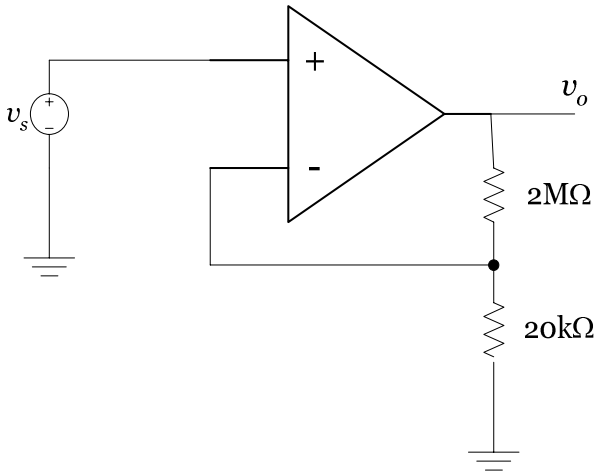


Student name: ID Number:

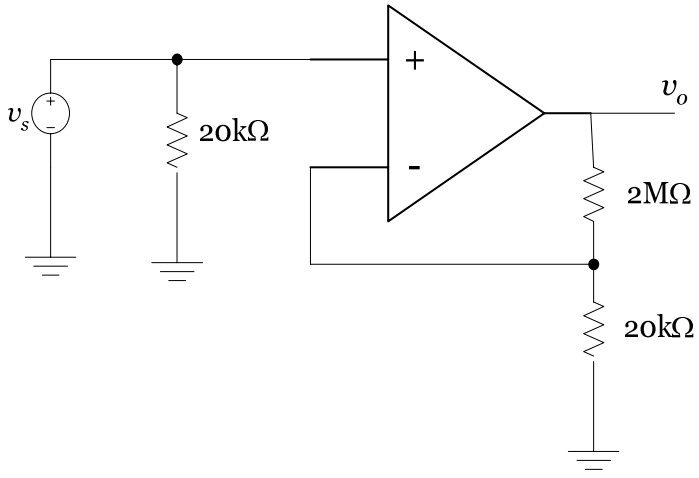
c)



d)



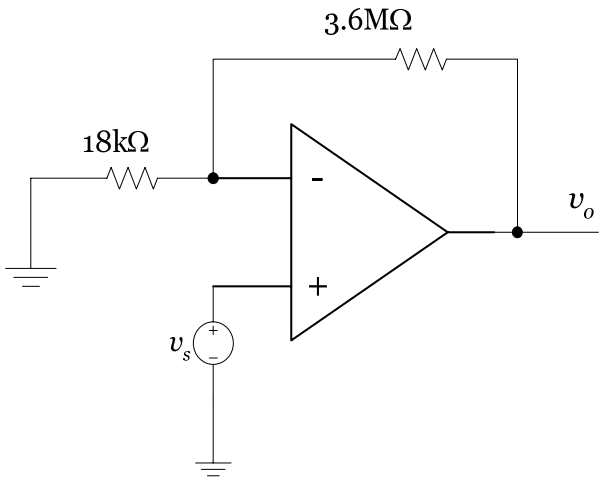
e)



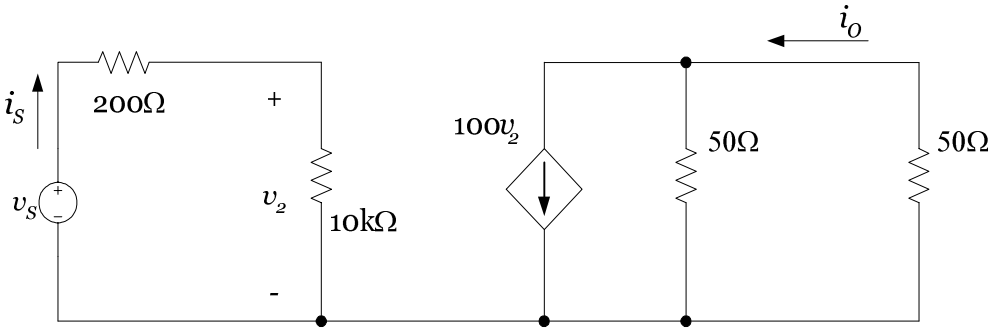
8) Consider the below circuit shown below. The magnitude and phase of the voltage gain are

a) 200, 0˚ b) 201, 0˚ c) 200, 180˚
d) 201, 90˚ e) 201, 180˚

Student name: ID Number:



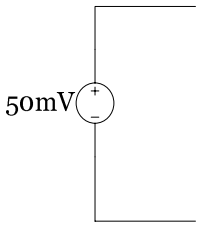
9) In the circuit below, the total forward transconductance (i_o/v_s) is given by:



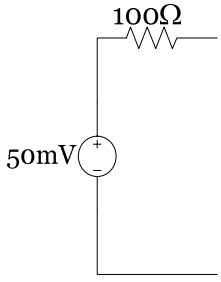
a) 101 b) 100 c) 50 d) 98 e) 49

10) Below, you are shown five source circuits. Identify the one case where the use of a unity gain non-inverting amplifier is required in order to deliver a drive current > 50uA to a 100 ohm load.

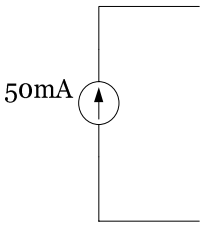
a)



b)



c)



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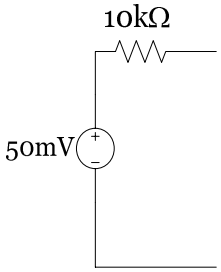
d)



e)