EECS   210 - Winter   1999
EXAM 1
Feb. 17 - 9h40 to 10h30 - Rooms 1200 (A-O) and 1005 (P-Z) EECS

Instructions:

- **Answer on this questionnaire**

- **Use PENS, not pencils**

- Write and sign the pledge below

- Closed book and notes

- One 8 1/2 x 11 sheet of paper allowed

- Calculators allowed

Read the questions carefully.
For full credit, you must explain your answers.

NAME:

WRITE PLEDGE:

SIGNATURE:

DO NOT TURN THIS PAGE OVER UNTIL TOLD TO DO SO!

Good Luck!
Stéphane Lafortune

Problem 1: (4 points: $1 + 1 + 2$)

Signal $f(t)$ has the following Fourier series expansion:

$$f(t) = 3 + \frac{12}{\pi}\left[\cos\left(\frac{\pi t}{2}\right) - \frac{1}{3}\cos\left(\frac{3\pi t}{2}\right) + \frac{1}{5}\cos\left(\frac{5\pi t}{2}\right) - \cdots\right]$$

1. What is the period of $f(t)$?

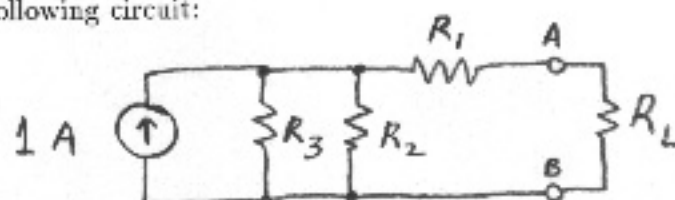**Answer: PERIOD =**

2. What is the average value of $f(t)$?

Answer: AVERAGE VALUE =

3. The signal $f(t)$ is applied to the input of circuit that transmits all frequencies between 1 Hz and 2 Hz and blocks all other frequencies. Write the expression of the output of this circuit.

Answer: OUTPUT =

Problem 2: (4 points: $2 + 1 + 1$)
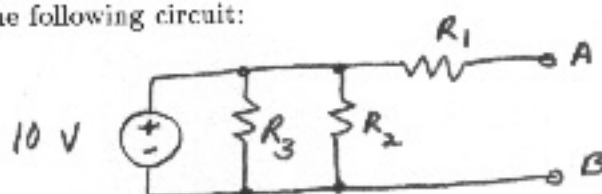
1. Consider the following circuit:

(a) Find the voltage v_T of the Thevenin equivalent seen by load resistor R_L at A and B.

Answer: $v_T =$

(b) Find the value of R_L, in terms of R_1, R_2, and R_3, that will maximize the power dissipated in R_L.

Answer: $R_L =$
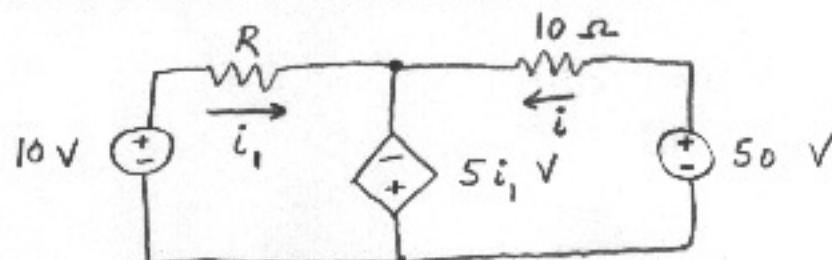
2. Consider the following circuit:

Find the value of the resistor R_T in the Thevenin equivalent between points A and B.
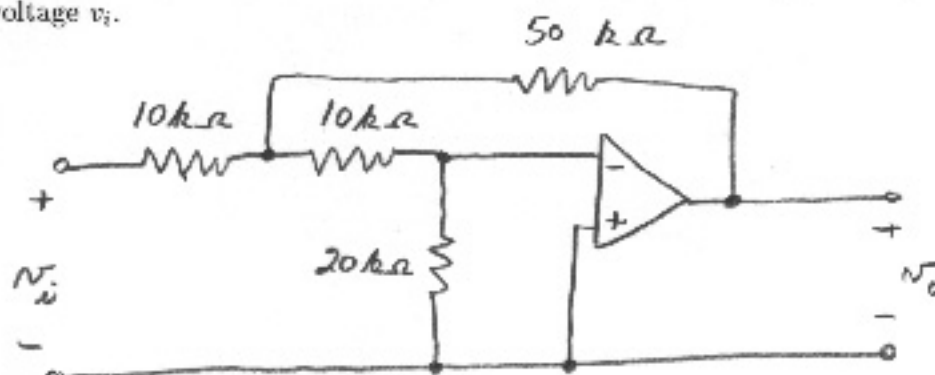
Answer: $R_T =$

Problem 3: (4 points)

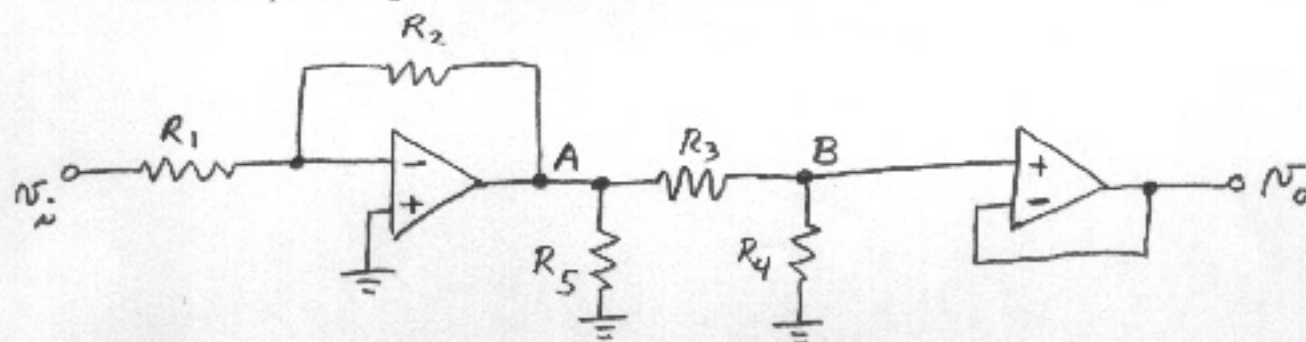Consider the circuit below. Find the value of the current i if $R = 15\Omega$.

Problem 4: (4 points)

Consider the op-amp circuit below. Find the expression of the output voltage v_o in terms of the input voltage v_i.

Problem 5: (4 points)

Consider the circuit below containing two op-amps. Find the expression of the output voltage v_o in terms of the input voltage v_i and of R_1 to R_5.

Extra Credit: (0.2 point)

Who was born first, Gustav Kirchhoff or Georg Simon Ohm?

Answer:

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THE END

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