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 Lafontune
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 a 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:

![Circuit Diagram]

(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:

![Circuit Diagram]

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:

THE END