This lab examines RC and RL circuits, and two RC op-amp applications.

**Part A**

1. Build the circuit of Fig. 1. Note that the 50-Ω resistor is the Thevenin resistance of the function generator. Estimate the $RC$ time constant ($\tau$), then set the function generator to produce a square wave output with 5-V peak-to-peak amplitude and period $20\tau$.

2. Sketch $V_s(t)$ and $v_o(t)$ on the same graph.

3. Measure the time constant $\tau$ using the tangent method (see Appendix). Compare your result with theoretical expectations.
Part B

1. Build the circuit of Fig. 2. Note that the 50-Ω resistor is the Thevenin resistance of the function generator. The resistance $R_x$ is the parasitic series resistance of the inductor coil. Use the multimeter to measure it. Estimate the $RL$ time constant ($\tau$), then set the function generator to produce a square wave output with 5-V peak-to-peak amplitude and period $20\tau$.

2. Sketch $V_x(t)$ and $v_o(t)$ on the same graph.

3. Measure the time constant $\tau$ using the tangent method (see Appendix). Compare your result with theoretical expectations.
Part C

1. Build the circuit of Fig. 3. Let $V_S(t)$ be a square-wave signal with 2-V peak-to-peak amplitude and 5-ms period.

2. What is the function of this circuit?
Part D

1. Build the circuit of Fig. 4. Let $V_S(t)$ be a square-wave signal with 2-V peak-to-peak amplitude and 5-ms period.

2. What is the function of this circuit?
Appendix

You can estimate a time constant from an oscilloscope trace by observing the tangent to the waveform at the point of initial decay (or rise) — see Fig. 5.

Be sure to expand the oscilloscope scales to ensure an accurate estimate.