Problem 1:

(A) Derive the $v_T$-$i_T$ characteristic for the circuit shown below. Make sure your description includes algebraic equations, regions of validity and a large $v$-$i$ graph clearly labeled (which may be drawn by hand neatly).
(B) Predict the behavior of this circuit if a capacitor is placed across the terminals as shown below. Use a copy of the $v$-$i$ plane you obtained previously to show it.

(C) Verify empirically the existence of this behavior. Include the empirical data or graph and make sure it is quantitatively accurate.