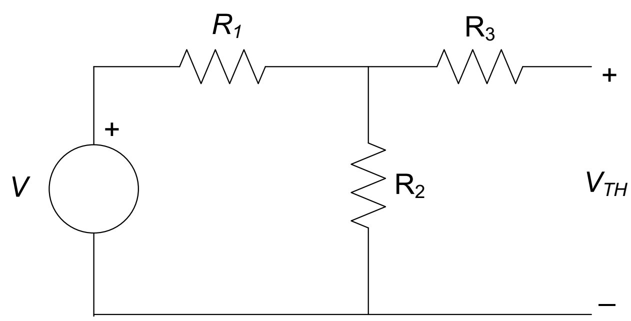
Engr228 Lab #3 – Pre-lab Assignment

Thévenin and Norton Equivalents

Name ____________________________ **Grade** _______/10

Note: Round your results to four significant digits but carry more digits in intermediate calculations.

1) For R_1 = 130 Ω, R_2 = 560 Ω, and R_3 = 300 Ω in the circuit below, replace the voltage source with a short circuit and calculate the Thévenin resistance (R_{TH}). This is the resistance seen looking into the circuit from the right, i.e. into the + and – terminals.



$R_{TH,\ Calculated}$ = __________ Ω

2) For V = 10 volts, calculate the open-circuit voltage V_{TH} at the output.

$V_{TH,\ Calculated}$ = __________ V

3) Short the + and – terminals at the output and calculate the short-circuit current (Norton current) flowing from the + to the – terminals.

$I_{N,\ Calculated}$ = ___________ mA

4) Place a resistor (R) across the + and – terminals at the output. Calculate the voltage V_R for values of R ranging from 20 Ω to 1000 Ω. Calculate the current through R and the power dissipated in R for each value of R and fill in the table below.

R Ω	**20**	**35**	**50**	**100**	**200**	**300**	**400**	**500**	**600**	**800**	**1000**
V_R (V)											
I_R (mA)											
P_R (mW)											

5) Using Excel, do a least squared error trendline fit to the (I, V_R) data in the table above to determine the Thévenin voltage, V_{TH}, and the Norton current, I_N. Plot V_R (V) on the y-axis and I_R (mA) on the x-axis. The Thévenin voltage is the y-intercept, i.e. the open-circuit voltage, and the Norton current is the x-intercept, i.e. the short-circuit current. The slope of the line is the negative of the Thévenin (Norton) resistance divided by 1000. Label these points on the graph and record their values below, along with the calculated value of R_{TH}. Print out a copy of the graph to turn in with your pre-lab report.

V_{TH} = __________ V I_N = ___________ mA

R_{TH} = ___________ Ω r^2 = ____________