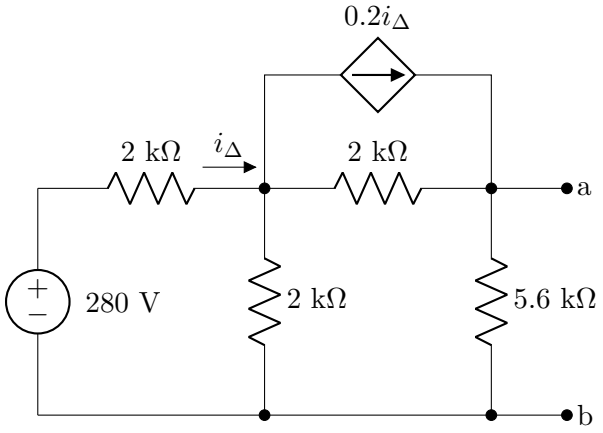
ECE 2260 quiz01

Name: SOLUTIONS

Find the Thevenin equivalent with respect to the terminals a,b for the circuit below. Write your answer in the box provided.



Solution: We being by finding the Thevenin voltage v_{th} across terminals a and b. We will need to find the voltage over a and b with no load connected. We see there are two nodes and a dependent current source, so we will have a three equation system to solve. Solving this gives us $v_1 = 120$ V, $v_{\text{Th}} = 112$ V, and $i_\Delta = 80$ mA.

Next, we need to find the Thevenin resistance R_{th}. To do this, we short a and b and solve for the current over the short i_{sc}. Here we will use mesh current with two mesh currents i_Δ and i_{sc}. Solving this system gives us $i_\Delta = 100$ mA and $i_{\text{sc}} = 60$ mA.

Finally, we can find the Thevenin resistance as

$$R_{\text{th}} = \frac{v_{\text{th}}}{i_{\text{sc}}} = \frac{112 \text{ V}}{60 \text{ mA}} = 1.867 \text{ kΩ}.$$

$v_{\text{th}} = 112$ V $\qquad\qquad$ $R_{\text{th}} = 1.867$ kΩ