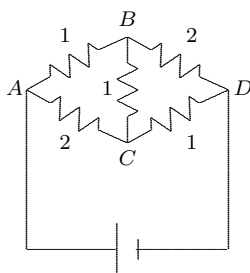


Due Thursday, October 11th.

- Suppose in an electrical circuit, point A is joined to B by a resistor of resistance 1 ohm, B is joined to D by a resistor of resistance 2 ohms, A is joined to C by a resistor of resistance 2 ohms, C is joined to D by a resistor of resistance 1 ohm, and B is joined to C by a resistor of resistance 1 ohm. What is the resistance between A and D (i.e., what is the voltage across A to D if an external battery forces a current of 1 Amp to flow from A to D)?



- Write the following transformation as a matrix.

$$T([x, y, z]) = [2z - y, x + 7z].$$

- Show using matrices that if we rotate the plane counterclockwise through an angle of θ and then reflect in the y -axis, the result is the same as reflecting in the y -axis and then rotating by an angle $-\theta$. [Hint: Reflection in y -axis is given by $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$.]
- If A is invertible, show that $\text{rank}(AB) = \text{rank}(B)$.
- Show that for $m \times n$ matrices, $\text{rank}(A + B) \leq \text{rank}(A) + \text{rank}(B)$.