

MAE 140 – Linear Circuits – Winter 2008
Midterm

Instructions

- 1) This exam is open book. You may use whatever written materials you choose, including your class notes and textbook. You may use a hand calculator with no communication capabilities.
- 2) You have 45 minutes.

Question 1 — Equivalent Circuits

Part (i) [6 marks] Use source transformations and association of resistors to find the Thévenin equivalent to the circuit in Figure 1 as seen from terminals C and D.

Part (ii) [2 marks] Find the power absorbed by a $5\,\Omega$ resistor that is connected to terminals C and D.

Question 2 — Nodal and Mesh Analysis

Part (i) [6 marks] Formulate mesh-current equations for the circuit in Figure 1. Use the mesh currents indicated in the figure and clearly indicate the final equations and the unknowns they must be solved for. You do not have to solve any equations!

Part (ii) [6 marks] Assuming that the node labeled D is the ground node (reference), formulate node-voltage equations for the circuit in Figure 1. Use the node labels provided in the figure and clearly indicate how you handle the presence of voltage sources, the final equations and the unknowns they must be solved for. Do not solve any equations!

Question 3 — Bonus question

[3 marks] Use superposition to find the total power absorbed by the circuit in Figure 1.

