MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Department of Electrical Engineering and Computer Science

Department of Mechanical Engineering

6A32 / 2A29	Information and Entropy	Fall 1999
Date Issued: Sep 14, 1999	Homework 1	Date Due: Sep 21, 1999

In this seminar, MATLAB will be used frequently on homeworks, experiments, and projects. MATLAB is mathematics software package effective in matrix operations as well as data visualization. To make MATLAB accessible on any Athena workstation, type `add matlab` at the prompt. Then type `matlab` to enter the program.

Problem 1

A MATLAB tutorial is available online and can be accessed at the following web site. You may have to wait a few seconds while the document loads. If you are accessing the web via a PC or Mac, download Acrobat Reader from http://www.adobe.com.

http://web.mit.edu/6.003/www/PDFfiles/matlab.pdf

Go through the MATLAB tutorial to familiarize yourself with the syntax and environment. Remember that at any time, you can type `help` at the MATLAB prompt.

Problem 2

Using MATLAB, prove that DeMorgan's Theorem is true.

$$\overline{(\text{A OR B})} = \overline{\text{A}}\ \text{AND}\ \overline{\text{B}}$$
$$\overline{(\text{A AND B})} = \overline{\text{A}}\ \text{OR}\ \overline{\text{B}}$$

Hand in your MATLAB code and any relevant output. Using `diary` will keep track of all your commands and output them to a file.

Hint: MATLAB has functions `or`, `and`, and `not`. They are also shortcuts: | = or, & = and, ~ = not.

Problem 3

Is the XOR logic gate reversible or not? Prove your answer using MATLAB. Hand in your MATLAB code and any relevant output.