

## CS/EE 120B

### Homework #2    Given 2/15/01. Due 2/22/01

1. Use a custom datapath to design a circuit at the FSMD level for the following problem:

Input an 8-bit number. Output a 1 if the number has the same number of 0's and 1's, otherwise, output a 0.  
e.g. the number 10111011 will produce a 0 output, whereas, the number 00110011 will produce a 1 output.

Solve the problem by answering the following questions.

- a) Write the high-level pseudo code program to solve the problem.
- b) What is the minimum number of registers and functional units needed in the datapath? Specify what the functional units are and what variables are being assigned to the registers.
- c) Draw the datapath circuit.
- d) Derive the state action table for a Moore machine.
- e) Derive the next-state and output equations.
- f) Draw the FSMD circuit.