

# **Assignment #2**

## **Number Conversions**

**Due: Sunday, 10/01/17, 11:59pm**

### **(40Pts) Binary Problems:**

- Convert the following numbers from binary to decimal: 1011, 1100, 11110, 101
- Convert the following numbers from decimal to binary: 31, 20, 1000, 12
- How many possible numbers can be represented in x bits?
- In a signed system, what is the range of positive and negative numbers that can be represented in x bits?
- In an unsigned system, what is the range of positive numbers that can be represented in x bits?

### **(40 Pts) Specify an Algorithm:**

Write the specific steps for a robot to convert a positive decimal (base 10) number less than (not equal to!) 256 to a binary (base 2) number. This robot can carry out simple instructions and mathematical operations, but it does not have any memory!!! The robot is given the decimal number on one index card, and it must produce the binary number on the blank index card. You may use more index cards if you need, but you must have at least two. These index cards can serve as devices for input and output, as well as for memory locations.

You must be very explicit! Your algorithm must specify enough details from getting the decimal number to writing the binary number on a piece of paper! The TAs will test this algorithm by being the robot!!! ☺

### **(20 pts) Metacognitive Questions:**

- What are the possible bad decimal numbers?
- What will your robot do with bad decimal numbers?
- How would you change your algorithm to handle bad decimal numbers?
- How would your algorithm change if we didn't know the maximum decimal number?

Electronically submit your document **as a pdf** by the assignment due date, using TEACH: [https://secure.engr.oregonstate.edu:8000/teach.php?type=want\\_auth](https://secure.engr.oregonstate.edu:8000/teach.php?type=want_auth)