

# ECE 1315 - Lab #4: Multiple Output Minimization

The company you work for, UGVs-Are-Us, has just received a contract to encode the movement commands given to an autonomous land vehicle wirelessly (there are multiple codes corresponding to the same movement in case it is intercepted). Your company has decided to encode the signals according to Table 1. The input is sent to the vehicle where it is converted into the movement. Since the movement command is extremely important, the output code has a minimum distance of two. Your job is to design a minimal circuit to convert the input signals to the necessary output signals (which would then be passed to each wheel and converted to corresponding physical movements).

**Table 1: Command Conversion**

Input ( $X_2, X_1, X_0$ )	Movement	Output ( $F_2, F_1, F_0$ )
000	Reverse	110
001	Forward	000
010	Reverse	110
011	Left	101
100	Left	101
101	Right	011
110	Left	101
111	Forward	000

Take advantage of the “multiple output” information in the textbook to build the circuit implementing the three functions with a minimal number of chips overall. Test your circuit by generating a truth table showing the three functions on the LogiScan. Remember to get your lab instructor to check your result, and sign his/her sheet with the number of components you used after you’ve answered the questions.

Q#1: Does minimizing each function separately necessarily lead to the overall minimum design?