ELCT201 Digital Logic Design – spring 2022 **Assignment 2 & 3 Adders**

Problem I:

Implement a single output circuit that gives an output of logic 1 when the input binary number is equivalent to one of the five decimal digits after the dash in your ID number.

For Example: If your ID number is 55-16382, your output will be equal to 1 if the input binary number in the truth table is equivalent to 1,6,3,8 and 2. I.e.: The output of the function should be logic 1, corresponding to the rows numbered 1, 6, 3, 8 and 2 from the truth table (keep in mind that the first row of the truth table is numbered zero).

For special cases ID numbers; if your ID number is less than 5 digits then embed with zeros to the left most to make them a total of 5 decimal digits. For example, if your ID number is 55-811 (use 55-00811), your output will be equal to 1 if the input binary number in the truth table is equivalent to decimal 0,8 and 1.

The six invalid binary input combinations should lead to don't care conditions.

The circuit should be implemented using NAND gates only

Problem II:

Design a combinational logic circuit that computes the function F(x) = x^2 + 2, where x is a 3-bit input, x = {x2, x1, x0}.

Implement the function using NOR gates only.

Problem III:

1. Design an incrementer circuit (a circuit that adds one to a four-bit binary number) using half adders.
2. Apply the functionality on the first digit in your ID and trace the output
    - I.e. (55-12345: 5+1 = 6)

Problem IV:

- Trace the below circuit and write a logical expression for the outputs P0, P1, P2, P3, P4 and P5