南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

CS211 Digital Logic (H)

Assignment 1
Due on 23:55, Jul. 13, 2022

Write down your answer to the questions in the given box with **detailed** procedures. For design questions, only drawing the circuit will lead to zero point.

Name: _____ Student ID: _____

Question:	1	2	3	4	5	6	7	8	Total
Points:	10	3	9	18	18	10	12	20	100
Score:									

1. (10 points) Convert the decimal number 196.3 to base 3, base 4, base 5, base 11, and base 16.

2. (3 points) Find the 10's complement of $(902)_{11}$.

3. (9 points) For the function $F = AB'C' + AB$, find the logic value of F under the conditions
   (a) $A = 1, B = 1, C = 1$,
   (b) $A = 0, B = 1, C = 1$, and
   (c) $A = 0, B = 0, C = 1$.

4. (18 points) Simplify the following three-variable Boolean functions algebraically
   (a) $F = \sum(1, 2, 6, 7)$,
   (b) $F = \sum(0, 1, 2, 3, 6)$, and
   (c) $F = \sum(3, 4, 6, 7)$.

5. (18 points) Using a Karnaugh map, simplify the following functions
   (a) $F(A, B, C, D) = \sum(0, 2, 3, 6, 7, 10, 11, 12, 15)$,
   (b) $F(A, B, C, D) = \sum(1, 7, 9, 10, 12, 13, 14) + d(4, 5, 8)$, and
   (c) $F(W, X, Y, Z) = \prod(0, 2, 6, 11, 13, 14, 15) + d(1, 9, 10, 12)$.

6. (10 points) With the use of maps, find the simplest sum-of-products form of the function $F = fg$, where $f = abc' + c'd + a'cd' + b'cd'$ and $g = (a + b + c' + d')(b' + c' + d)(a' + c + d')$.

7. (12 points) Simplify the following Boolean expressions, using four-variable maps:
   (a) $A'B'C'D + AB'D + A'BC' + ABCD + AB'C$, and
   (b) $A'B'C'D' + BC'D + A'C'D + A'BCD + ACD'$

8. (20 points) Obtain the sum of the products expression for $F = \sum(1, 2, 4, 7, 8, 9, 11) + d(0, 3, 5)$ and implement it with
   (a) NAND gates only, and
   (b) NOR gates only.