

## CSC 244 Fall 2022 Homework 3

### Karnaugh Maps

Due: Wednesday, Sept. 14 before 9 am to D2L

1. Calculate the minimal sum-of-products (SOP) and product-of-sums (POS) using Karnaugh Maps for the truth tables

a)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

b)

A	B	C	Y
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

- c. What is the cost of the two circuits? State which is cheaper, SOP or POS.

2. Find minimal Boolean equations for the truth table below using both SOP and POS forms using K-maps.

A	B	C	D	Y
0	0	0	0	X
0	0	0	1	X
0	0	1	0	X
0	0	1	1	0
0	1	0	0	0
0	1	0	1	X
0	1	1	0	0
0	1	1	1	X
1	0	0	0	1
1	0	0	1	0
1	0	1	0	X
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	X
1	1	1	1	1

- i. Determine which circuit is cheaper
- ii. Draw the circuit for the **cheapest implementation** using only NAND gates (if sum-of-products form) or NOR gates (if product-of-sums form). You may also use inverters if needed.

3. Calculate the minimal SOP and POS for the following function using K-maps:
- Write two sentences on your solution to SOP; is it unique?

$$F(A,B,C,D) = \Pi(0,1,2,4,8,15)$$