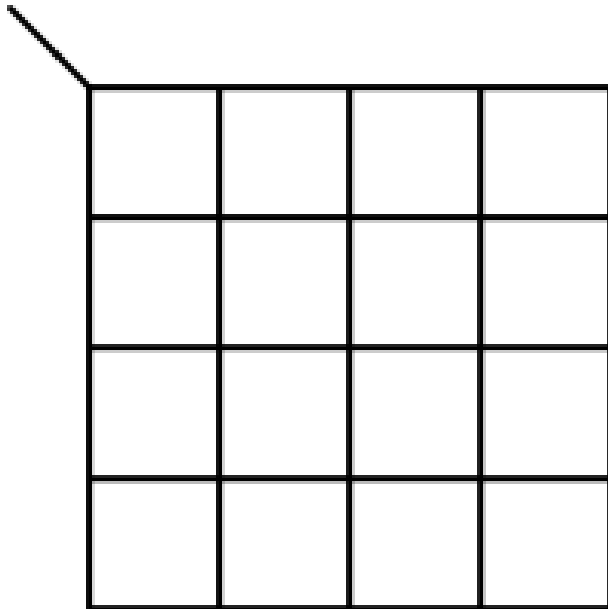


About how many hours did you spend actively working on this assignment? \_\_\_\_\_

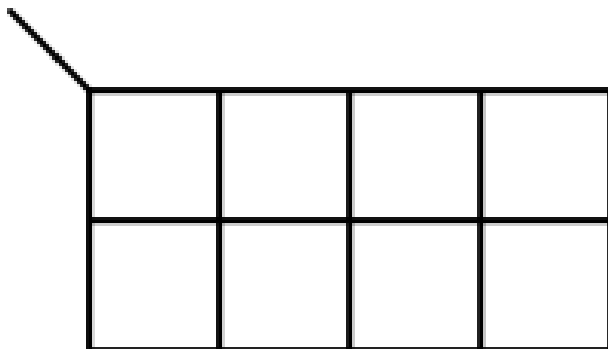
**Q1 Karnaugh Maps [14 points]**

**1a. Karnaugh Map - Boolean expression [6 points]**



**1b. Minimal sum-of-products expression for 1a [2 points]**

**1c. Karnaugh Map - 3-bit primes [4 points]**  
[Independent]



**1d. Minimal sum-of-products expression for 1c [2 point] [Independent]**

**Q2 Universal Muxification of Gates [12 points]**

**2a. NOT A [1 point]**

**2b. A AND B [2 points]**

**2c. A OR B [2 points] [Independent]**

**2d. A NAND B [3 points]**

**2e. A XOR B [4 points] [Independent]**

### 3. Switching Network [8 points]

4. Flop-flip-flopping [10 points]				4b. Explanation
Cycles Completed	Q <sub>2</sub>	Q <sub>1</sub>	Q <sub>0</sub>	
0 (initial)	0	0	0	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

**Q5 vALU [31 points]**

Draw circuits on next page, text answers here.

**5a. (i-iv) Condition Flags [4 points]**

(draw circuits on next page)

**5b. [4 points]** Result of the ALU when *Invert A = 1*, *Negate B = 1*, and *Operation ID = 10*.

**Explanation:**

**5c. (i) [2 points] A, B with correct result**

A =                      B =

**5c. (ii) [2 points] A, B with incorrect result**

A =                      B =

**5c. (iii) [1 point] Key effect**

**5c. (iv) [5 points]** Draw your circuit for the *Less-Than* on the next page.

**5c. (v) [3 points]** Control lines for *Less-Than*

*Invert A =*

*Negate B =*

*Operation =*

**5d. (i) [4 points]** Draw your *Equals* Flag design on the next page.

**5d. (ii) [3 points]** Control lines for *Equals*

*Invert A =*

*Negate B =*

*Operation =*

**5e. [3 points] [Independent]** Explanation comparing correctness of *Less-Than* and *Equals*.

5a. (i-iv) Condition Flags, 5c. (iv) Less-Than Flag, 5d. (i) Equals Flag. Label outputs clearly. If you prefer, you can include this page multiple times, once per sub-part (just label each).

