

Homework Assignment #3

Assigned: 06/11/2021

Due: 14/11/2021 11:55 PM

Notes:

- Late submission policy:
 - If you miss the deadline, 20% will be deducted from your grade. After every 24 hours, another 20% will be deducted. For example, if you receive 90 out of the 100 points, and you are 40 hours late, your final grade will be 54 points.
 - After 4 days, solutions will be posted on SuCourse+.

Q1) Optimize the following using K-map

a) (10) $f(A,B,C,D)=A'B'+B'C+AC'+AD+ACD$

b) (10) $f(X,Y,Z,T) = \sum(0, 1, 2, 3, 4, 6, 8, 10, 12, 14)$

c) (10) $f(X,Y,Z,T) = \prod(0, 1, 2, 3, 4, 6, 8, 10, 12, 14)$

Q2) (20) Design a circuit with the following definition, using K-map approach:

- Input A: 3-bit unsigned number ($0 \leq A \leq 5$)
- Input B: 1-bit value
- Output C: 3-bit unsigned number ($0 \leq C \leq 5$)

If $B = 1$, $C = (A + 2) \% 6$

else, $C = (A - 2) \% 6$

Q3) (50)

Design a 2-bit signed/unsigned adder/subtractor circuit. Circuit will have a signed_unsigned input pin to determine the signed/unsigned operation and an adder_subtractor input to determine adder/subtractor operation. Draw the circuit diagram. Use the K-map approach, using only 4-value K-maps.