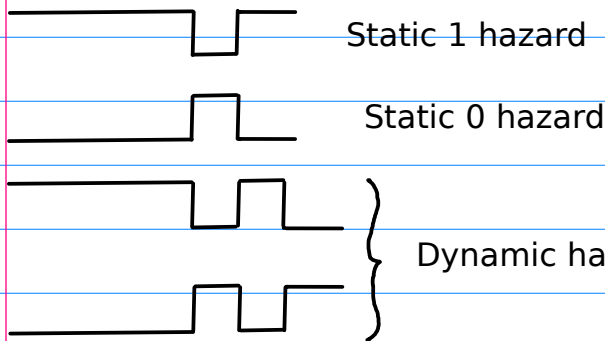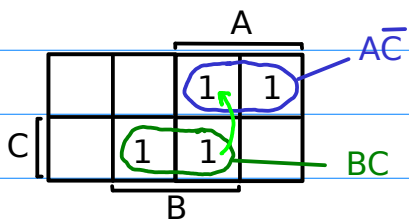# Hazards

Static 1 hazard

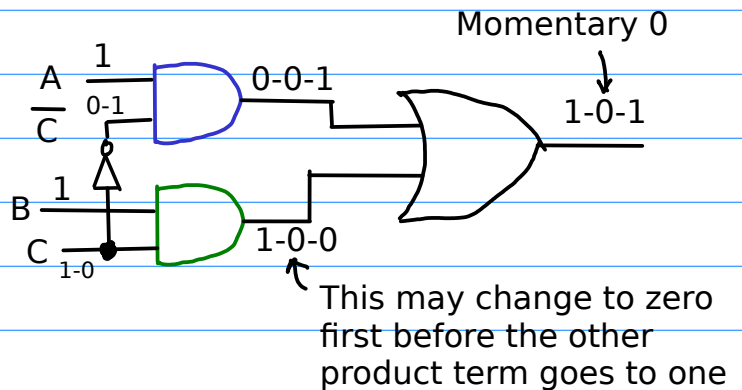Static 0 hazard

Dynamic hazards

With a combinational circuit, when a single input changes 0-->1 or 1-->0 but you get something like this on the output

ABC changes from 111 to 110
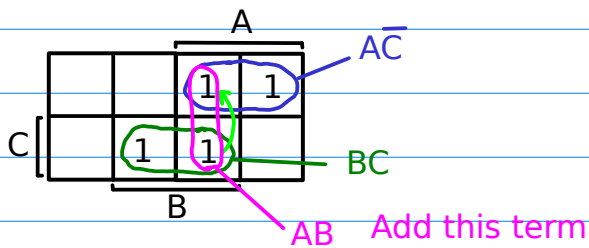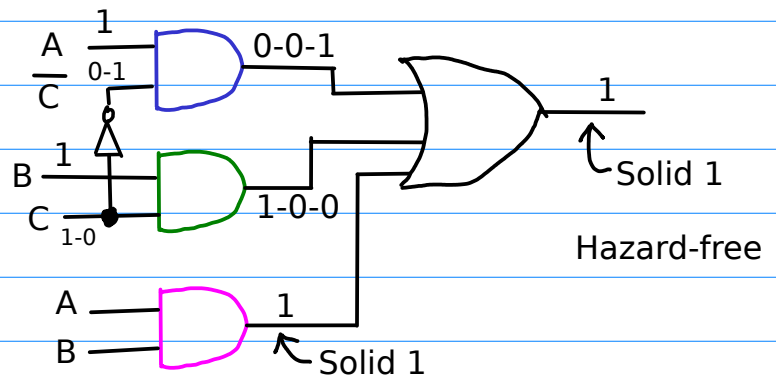(only C changes 1-0)

A

$A\overline{C}$

C

$BC$

B

Minimal SOP:
$f = A\overline{C} + BC$

Momentary 0

A  1
$\overline{C}$  0-1    0-0-1

1-0-1

B  1
C  1-0    1-0-0

This may change to zero first before the other product term goes to one

To avoid static hazards, "close all the gaps" in the K-map by adding extra product terms (or sum terms for a POS)

A

$A\overline{C}$

C

$BC$

B

$AB$    Add this term

$f = A\overline{C} + BC + AB$

no longer minimal,
but hazard-free

A  1
$\overline{C}$  0-1    0-0-1

1

Solid 1

B  1
C  1-0    1-0-0

Hazard-free

A
B    1

Solid 1

.

SOP can only have static-1 hazards
POS can only have static-0 hazards
Only circuits with more than two levels
    can have dynamic hazards.

for example