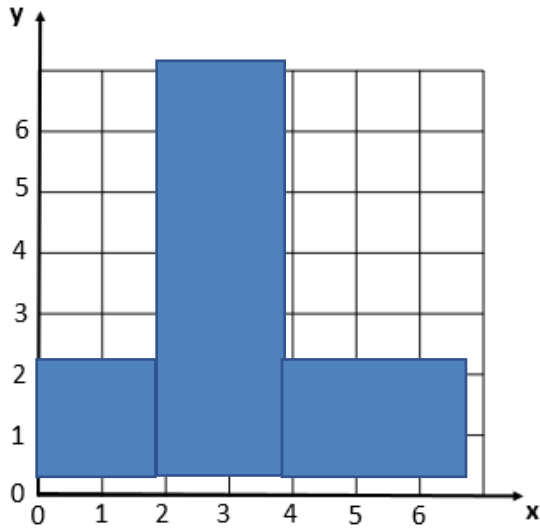


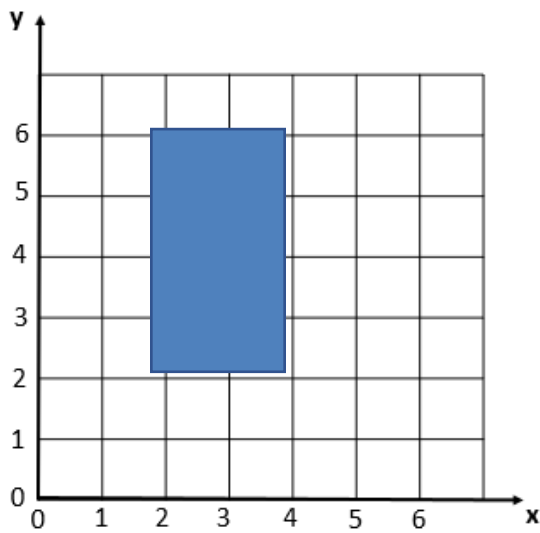
HOMEWORK

1. Draw the shape corresponding to the Boolean expression

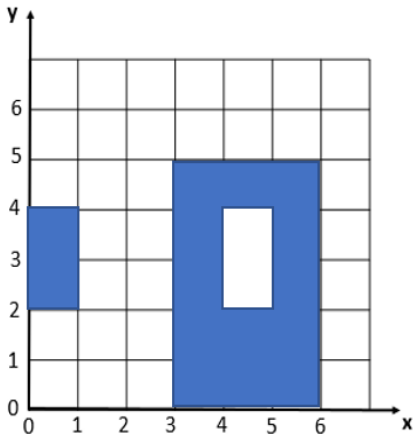
a, $(x > 2 \text{ and } x < 4) \text{ or } (y < 2)$



b, $(x > 2 \text{ and } x < 6) \text{ and } (y > 2 \text{ and } y < 6) \text{ and not}(x > 4)$



2, Write the boolean condition for this grid



Expression:

$(x > 0 \text{ and } x < 1) \text{ and } (y > 2 \text{ and } y < 4) \text{ or}$
 $(x > 3 \text{ and } x < 6) \text{ and } (y > 0 \text{ and } y < 5) \text{ and}$

$\text{Not}[(x > 4 \text{ and } x < 5) \text{ and } (y > 2 \text{ and } y < 4)]$

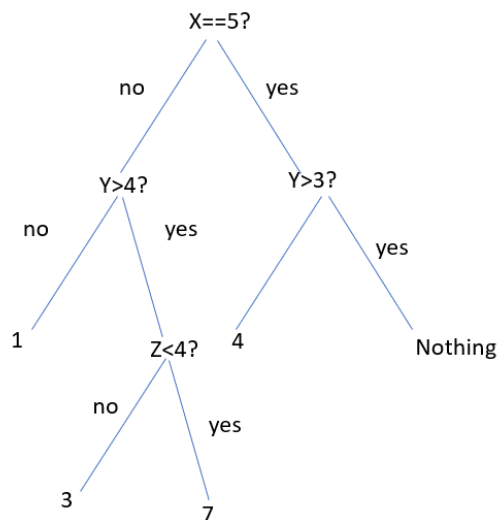
2. Demonstrate these equalities using the 9 simplification rules you have learnt:

- $\neg(C \text{ and } D) \text{ and } (\neg C \text{ or } D) \text{ and } (C \text{ or } \neg D) = \neg C$
 $\neg(C \text{ and } D) \text{ and } (\neg C \text{ or } D) \text{ and } (C \text{ or } \neg D) = \neg C \text{ or } \neg D \text{ and } (\neg C \text{ or } D) \text{ and } (C \text{ or } \neg D)$
 $= (\neg C \text{ or } \neg D) \text{ and } (\neg C \text{ or } D) \text{ and } (C \text{ or } \neg D)$
 $= \neg C \text{ or } (\neg D \text{ and } D) \text{ and } (C \text{ or } \neg D)$
 $= \neg C \text{ or } \text{False} \text{ and } (C \text{ or } \neg D)$
 $= \neg C \text{ or } (\text{False} \text{ and } C) \text{ or } (\text{False} \text{ and } \neg D)$
 $= \neg C \text{ or } \text{False} \text{ or } \text{False}$
 $= \neg C$

- $\neg(\neg C \text{ and } (\neg B \text{ or } \neg C)) = C$
 $= \neg[(\neg C \text{ and } \neg B) \text{ or } (\neg C \text{ and } \neg C)]$
 $= \neg[(\neg C \text{ and } \neg B) \text{ or } \neg C]$
 $= \neg[\neg C \text{ and } (B \text{ or } \text{true})]$
 $= \neg[\neg C \text{ and } \text{True}]$
 $= \neg(\neg C)$
 $= C$

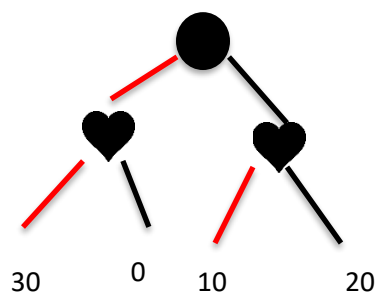
- $(A \text{ and } B) \text{ or } (A \text{ and } !B) = A$
 $= A \text{ and } (B \text{ or } !B)$
 $= A \text{ and True}$
 $= A$

3.. What is the output of flowchart? If $x=6$ and $y = 5$ and $z = 1$ **answer: The output flowchart is 7**



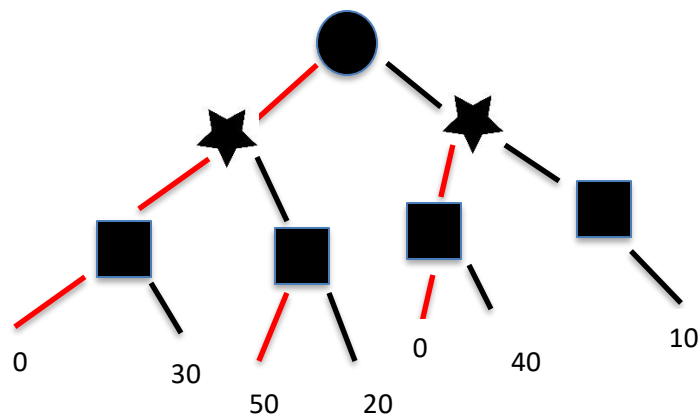
4. Draw the tree of conditions

CELL CONTENTS EXACTLY	POINTS
●	10
● ♥	20
<NOTHING>	30



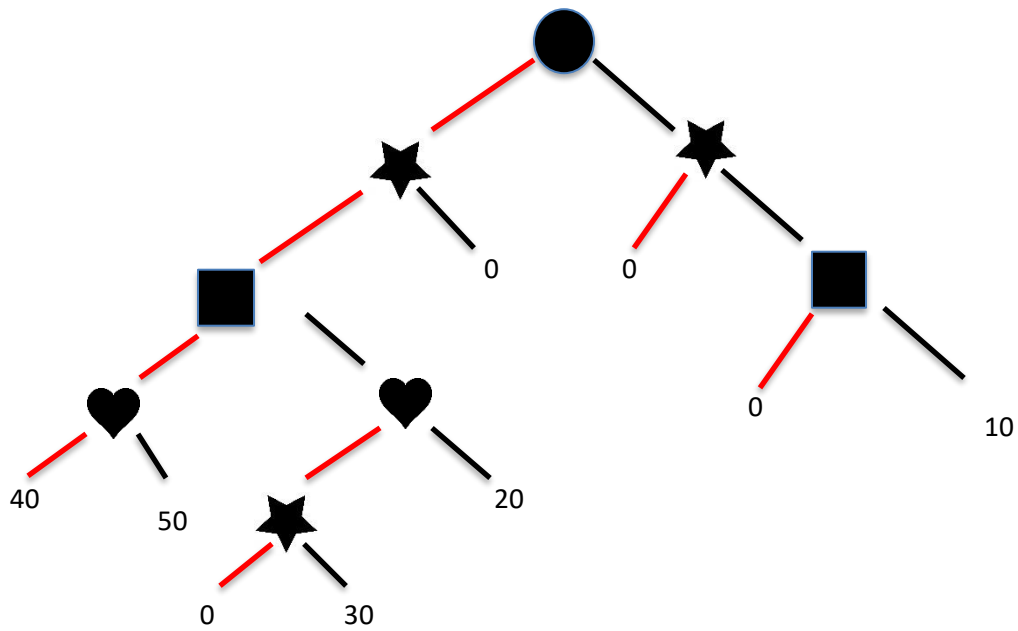
5. Draw the tree of conditions

CELL CONTENTS EXACTLY	POINTS
● ★ ■	10
★ ■	20
■	30
● ■	40
★	50

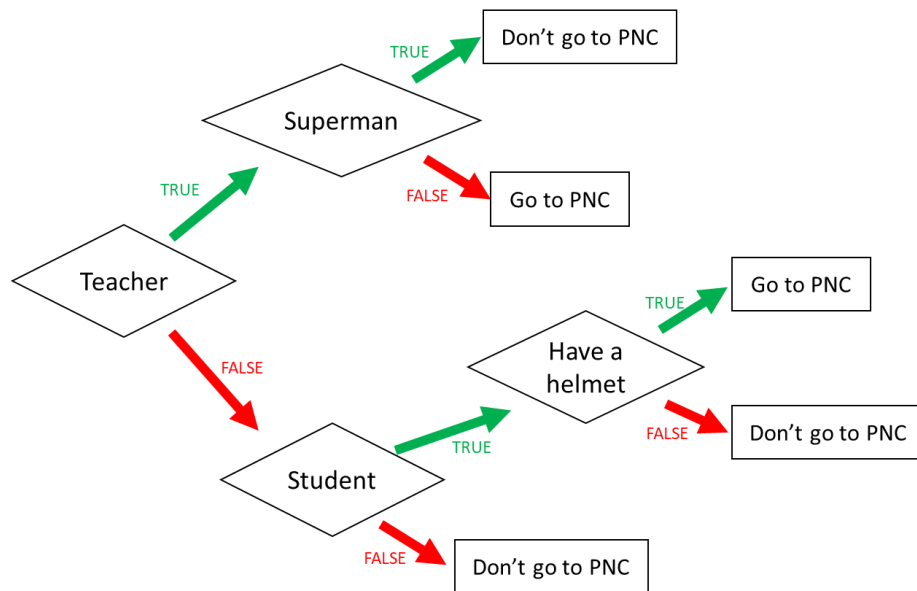


6. Draw the tree of conditions

CELL CONTENTS EXACTLY	POINTS
● ★ ■	10
■ ♥	20
■ ★	30
<nothing>	40
♥	50



7.



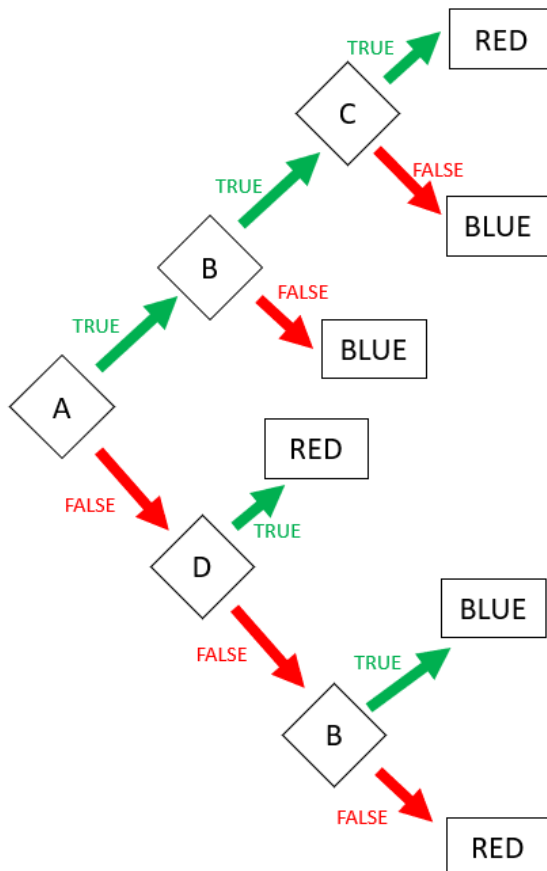
1. I am a teacher and I am superman, can I go to PNC? **Don't go to PNC**

2. I am not a teacher and not a student, can I go to PNC? **Don't go to PNC**

3. When can I go to PNC? (Express the condition using a Boolean expression)

I go to PNC if: I am a teacher and I am not superman or I am not a teacher and I am student and I have a helmet.

8



Expression: **RED** = ABC or $!AD$ or $!A!D!B$

Expression: **BLUE** (FALSE) = $A!B$ or $AB!C$

9. Encoding

- First 3 characters “MIX”, repeated many times (max repetition is 5)
- Then 1 character “!”, repeated many times (max repetition is 5)
- Then 1 number (0-3)

Examples:

MIXMIXMIX!1

MIX!!!!3

MIXMIXMIX!!!2

Q1. Propose an **encoding structure** to encode this image.

Encoding parts	Encoding values (in binary)
The repetition of text “MIX”: 1...5	001...101
The repetition of character “!”: 1...5	001...101
The number of the end: 0..3	00...11

Q2. What is the total **size** of your encoding? Give explanations.

Encoding size:8bits

Explanation:

Part1: 101 that mean text of MIX repeated 5 times

Part2: 101 that mean character if ! repeated 5 times

Part3: 11 that mean the number at the end is 3.

We want to encode a **text** following those rules:

- ✓ 3 letters: A, B, C
- ✓ The letters are always in the alphabetic order
- ✓ Letters are repeated from 1 to 10 times
 - Each letter is repeated the same number of times
- ✓ The last character must be either: X, Y, or Z

Examples:

ABCZ	Good
AAAABBBBCCCCX	Good
AABBCCY	Good
AAABBBCCCX	Good
AABBBBCCX	Bad: letter A is repeated 2 times but letter B 3 times

Q1. Propose an **encoding structure** to encode this image. (20pts)

Encoding parts	Encoding values (in binary)
The repetition of letter A,B,C (1...10)	0001...1010
The letter at the end x,y,z (0,1,2)	00,01,10

Q2. What is the total **size** of your encoding? Give explanations.

Encoding size:(4pts): **6bits**

Explanation:(6pts):

Part 1: 1010_The repetition of letter A,B,C (1...10)

Part 2: 10 The letter of the end.