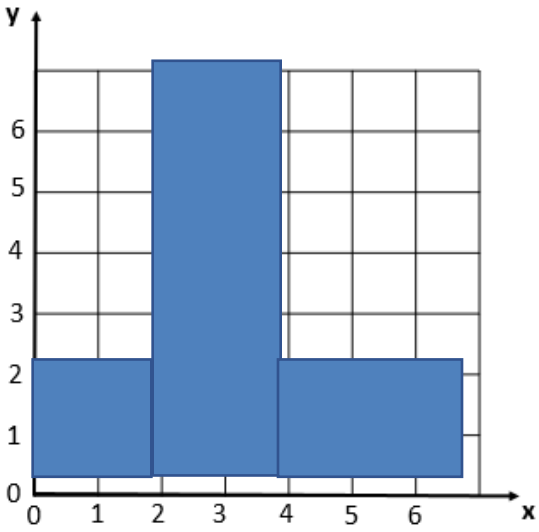
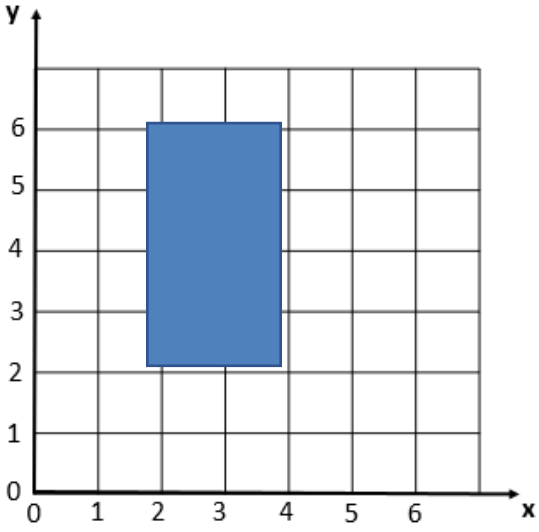
HOMEWORK

1. Draw the shape corresponding to the Boolean expression

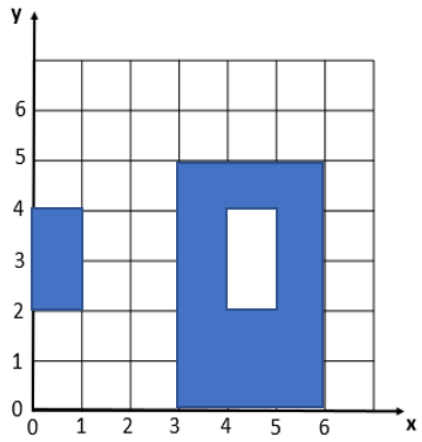
a, `(x > 2 and x < 4) or (y < 2)`



`b, (x>2 and x<6) and (y>2 and y<6) and not(x>4)`



2， Write the boolean condition for this grid



Expression:

(x>0 and x<1) and (y>2 and y<4) or
(x>3 and x<6) and (y>0 and y<5) and

Not[(x>4 and x<5) and (y>2 and y<4)]

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

- !(C and D) and (!C or D) and (C or !D) = !C

  !(C and D) and (!C or D) and (C or !D) = !C or !D and (!C or D) and (C or !D)
  = (!C or !D) and (!C or D) and (C or !D)
  = !C or (!D and D) and (C or !D)
  = !C or False and (C or !D)
  = !C or (False and C) or (False and !D)
  = !C or False or False
  = !C

- ! (!C and (!B or !C)) = C

  =!((!C and B) or !C)

= !(!(C and B) or !C)

=!(!(C and B) or C))

= (C and B) or C

= C and (B or True)

= C and True= C

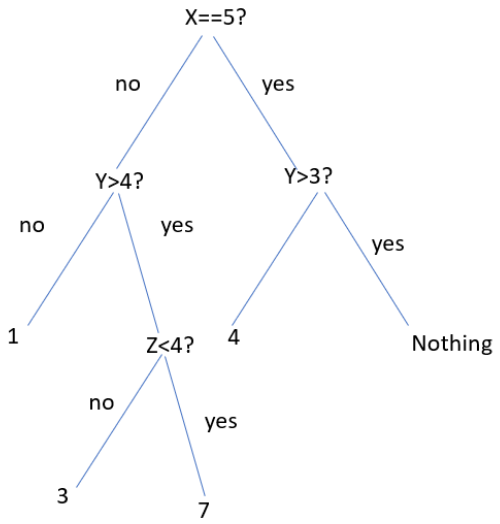
- (A and B) or (A and !B) = A

  =(A or A) and (B or !B)

  = A and True

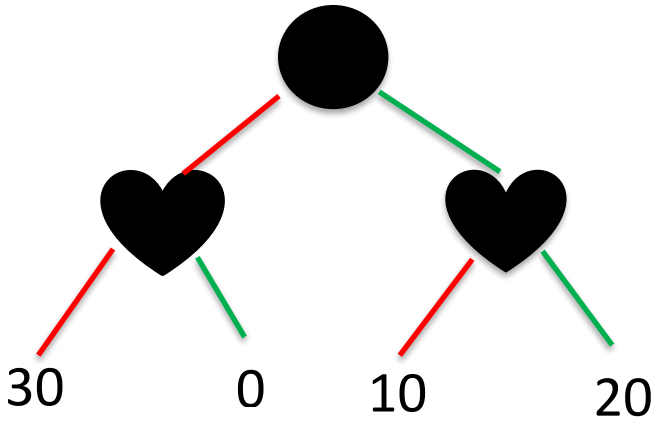
  = A

3.. What is the output of flowchart? If x=6 and y = 5 and z = 1



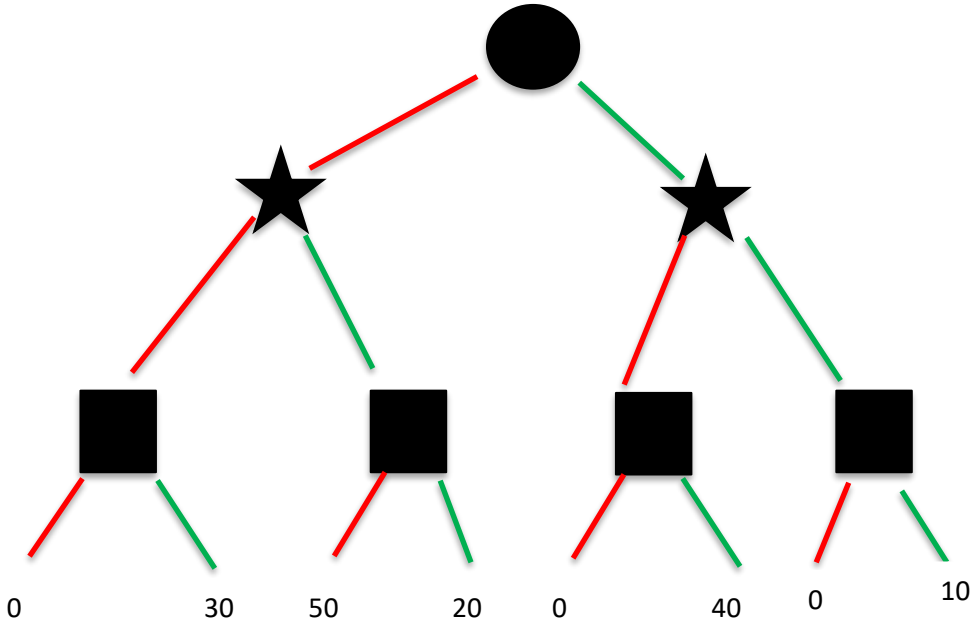
4. Draw the tree of conditions

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



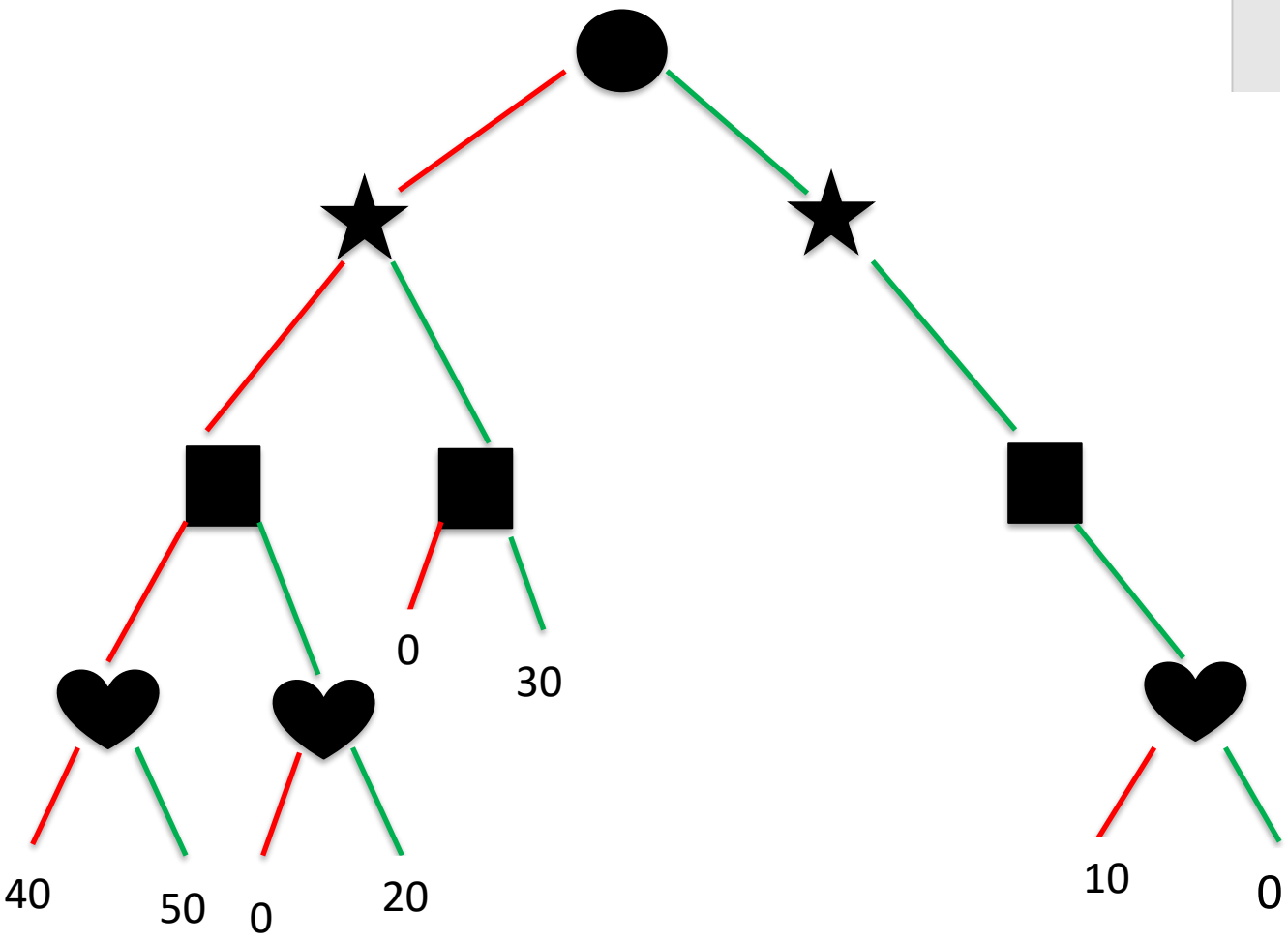
5. Draw the tree of conditions

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

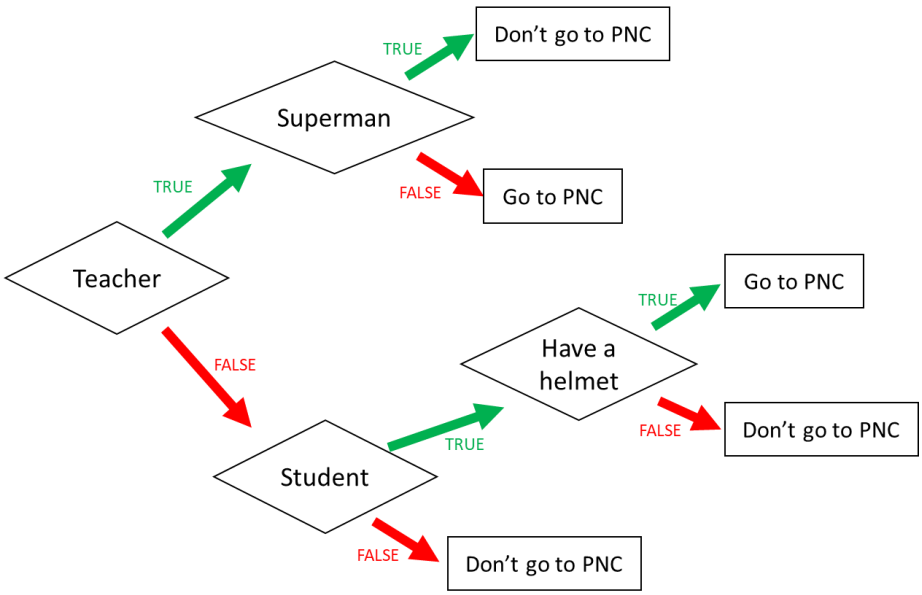


6. Draw the tree of conditions

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

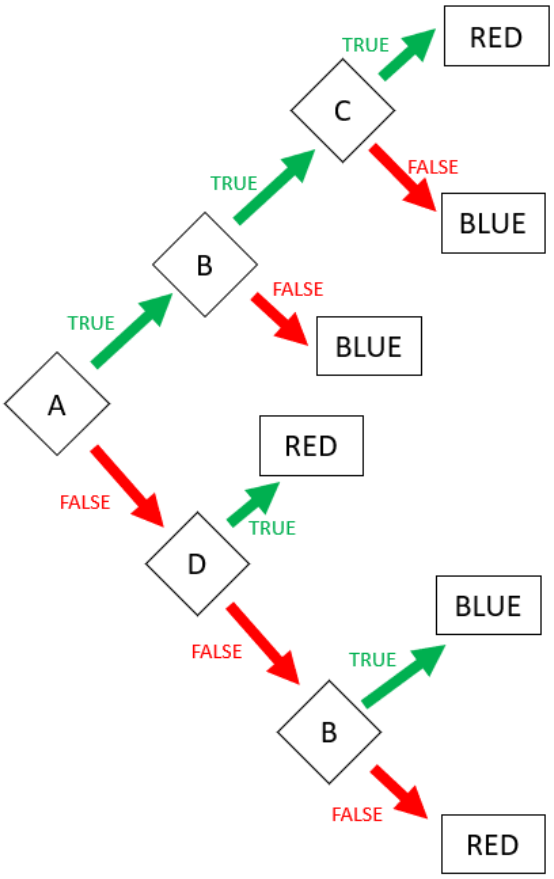
2. I am not a teacher and not a student, can I go to PNC?
   Don't go to PNC

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

I go to PNC if:

1. You are a teacher and not a superman.
2. You are not a teacher and you are a student.

8



Expression: **RED** = ABC or !AD or !(ADB)

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 ! reqpeated 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	0001 ……. 1010
The repetition of letter B	0001 …….. 1010
The repetition of letter C	0001 …….. 1010
The number of last character X T Z	00 … 10

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

Encoding size:(4pts)

Encoding size: 14 bits

Explanation:(6pts)

Part1: Letter A repeated 1 to 10 times

Part2: Letter B repeated 1 to10 times.

Part3: Letter C repeated 1 to 10 times.

Part4: The last characters X Y Z has only 1 time.