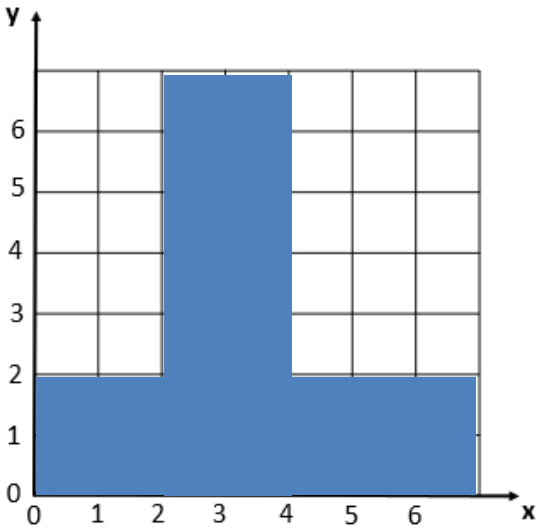
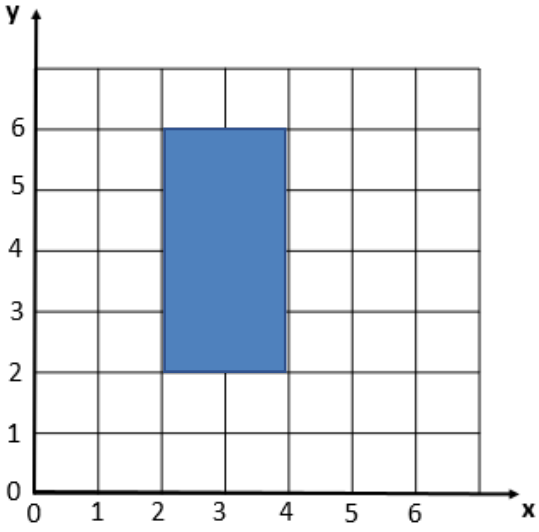
HOMEWORK

1. Draw the shape corresponding to the Boolean expression

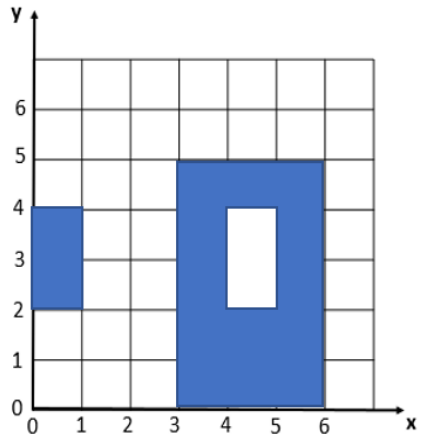
a, `(x > 2 and x < 4) or (y < 2)`



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>o 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 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 or false

  =!C

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

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

  =(C or (B and C))

  =C and (B and True)

  =C and true

  =C

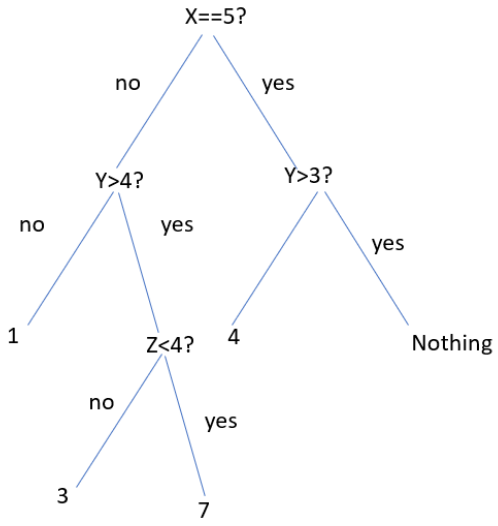
- (A and B) or (A and !B) = A

  = A and (B or !B)

  =A and true

  =A

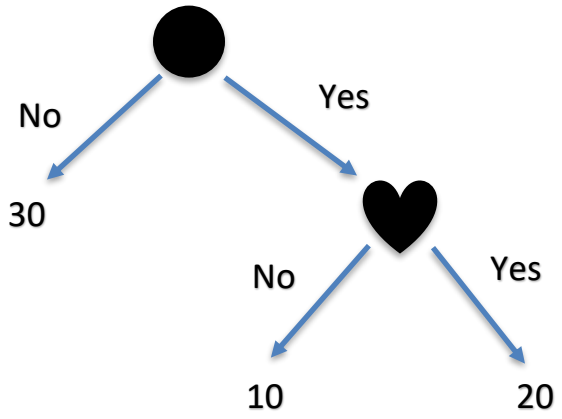
3.. What is the output of flowchart? If x=6 and y = 5 and z = 1



The output of this flowchart is 7

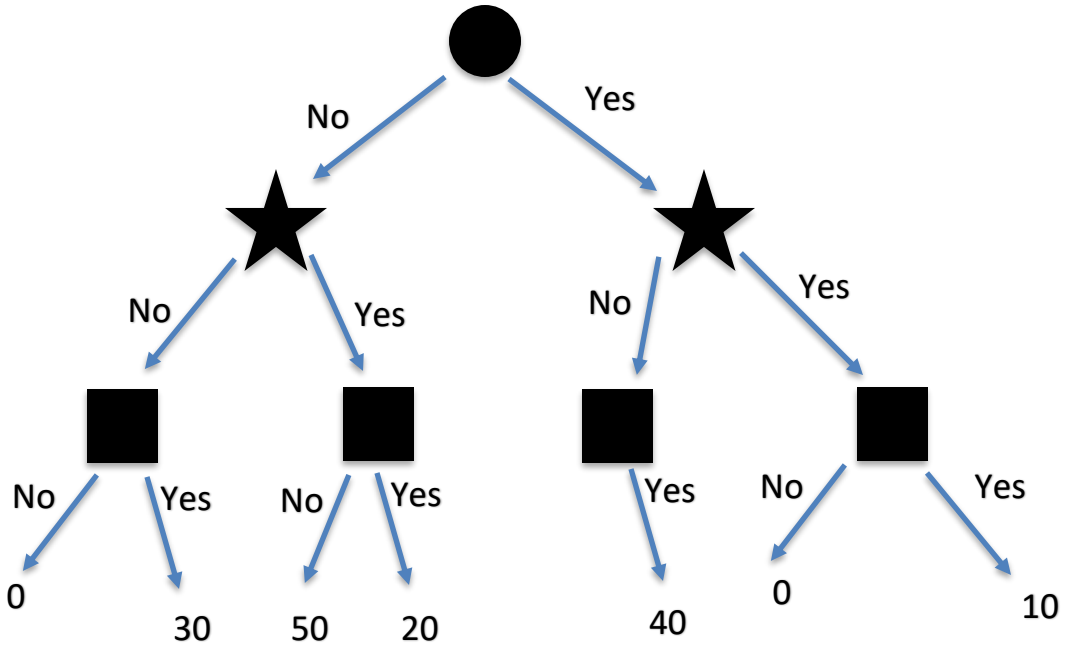
4. Draw the tree of conditions

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



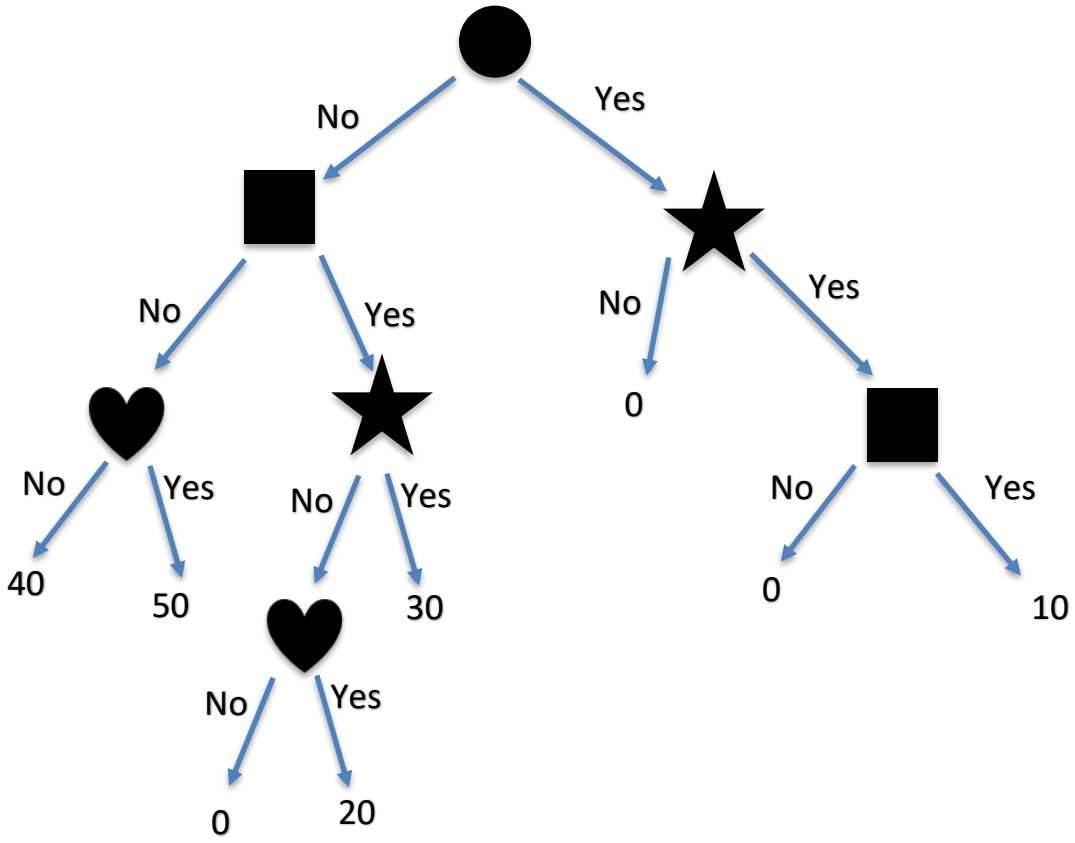
5. Draw the tree of conditions

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

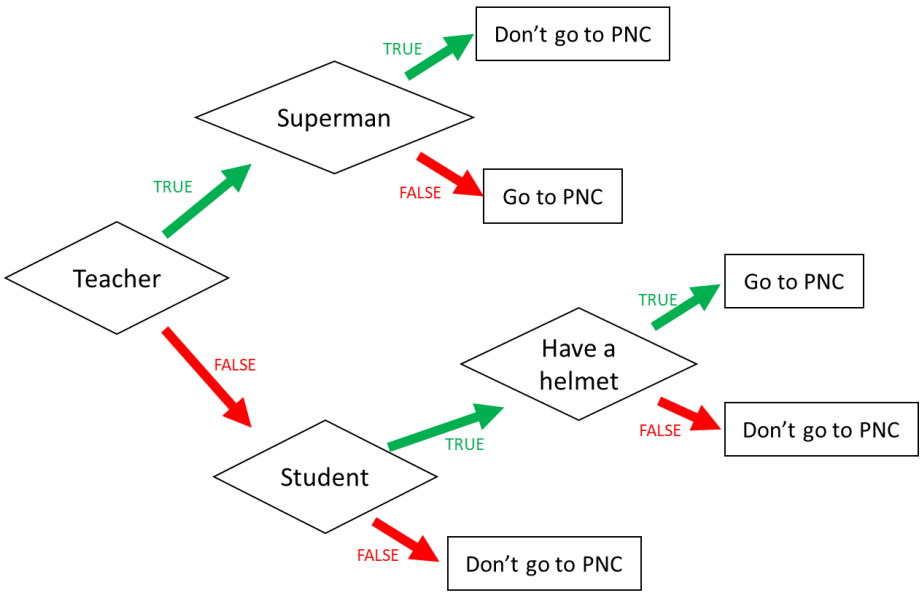


6. Draw the tree of conditions

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



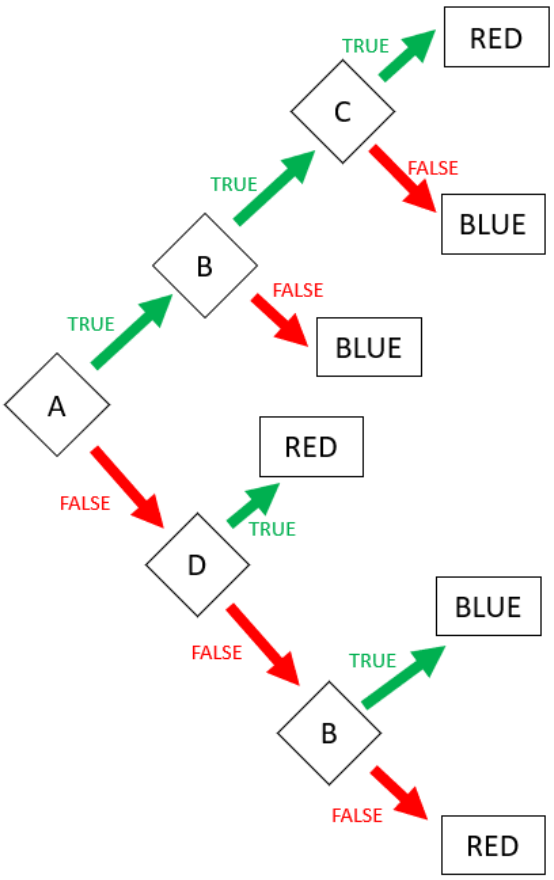
7.



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 not superman or I am not a teacher and I am a student and I have a helmet



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

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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 repeatation of letters "A","B","C": 1....10	0001....1010
The last characters : X : 0 Y : 1 Z : 2	00 01 10

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

Encoding size:(4pts)

Total encoding size is :6 bits

Explanation:(6pts)

- Part 1 : 1010 that mean letters “A” and “B” and “C” repeated 10 time
- Part 2 : 00 is letter X, 01 is letter Y, 10 is letter Z