

8 Jan  
2023

# Revision

## SVM

• Support Vector machine

1 Support Vector

2 margin

3 hyper plane

4 linear And Non linear  
data

• Code

kernel  $\rightarrow$  high dimension  
data

$C$  = Regularization

$\gamma$  =

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# Decision Tree

John -

17



School

10<sup>th</sup> grade

0 Levels  
High School

20



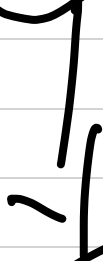
College

Univ

school

~~Age~~

10



Refine

Mind map

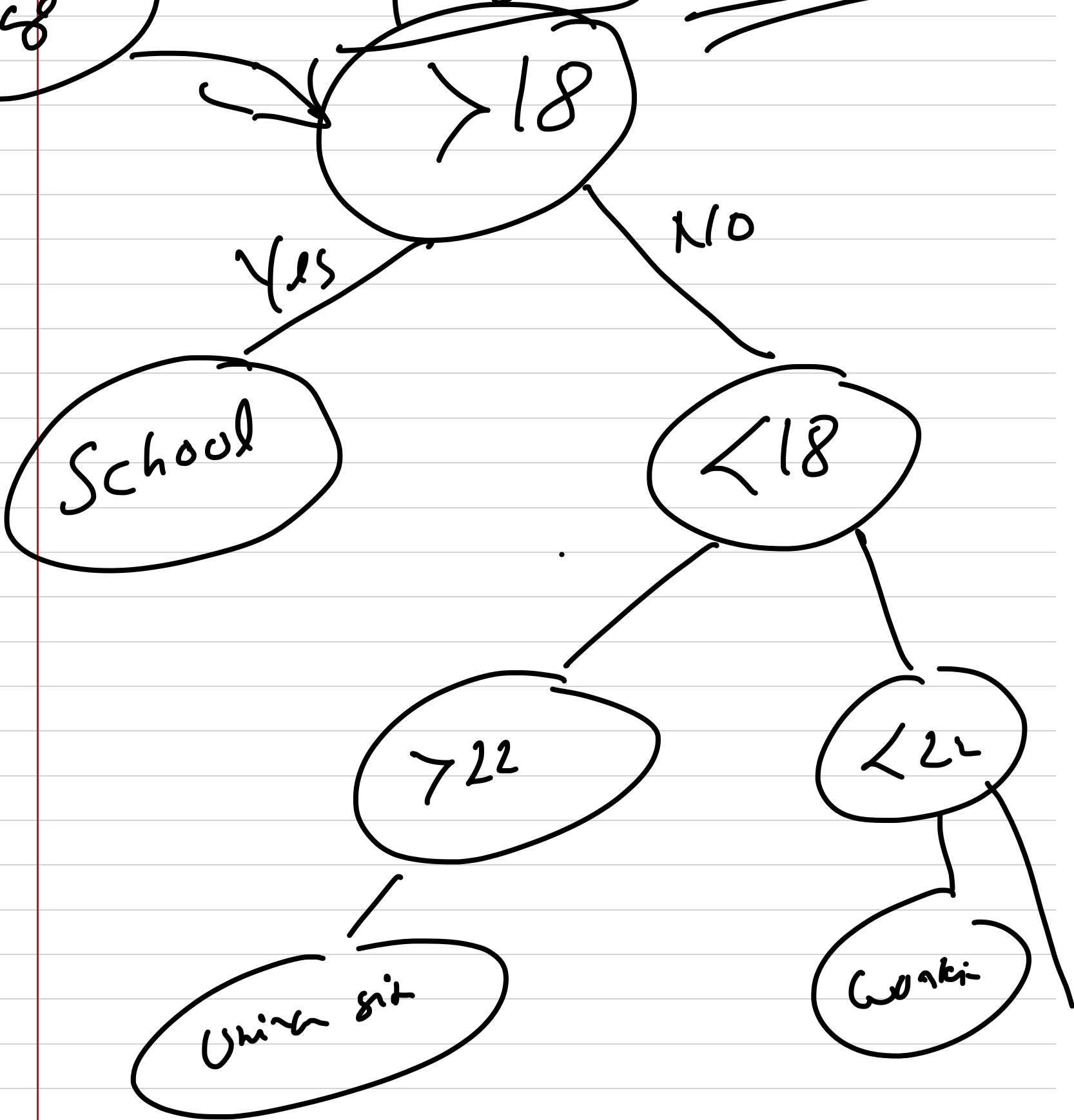
DT

Age model

Age

70%

by 30%  
what's age



Q2) Similar to the Age

(can you give me  
Similar Decision tree

- o Eimon - Disease diagnosis

- o Robin

- Weather Forecast
  - o Temp
  - o wind
  - o month

malish - Custom Car

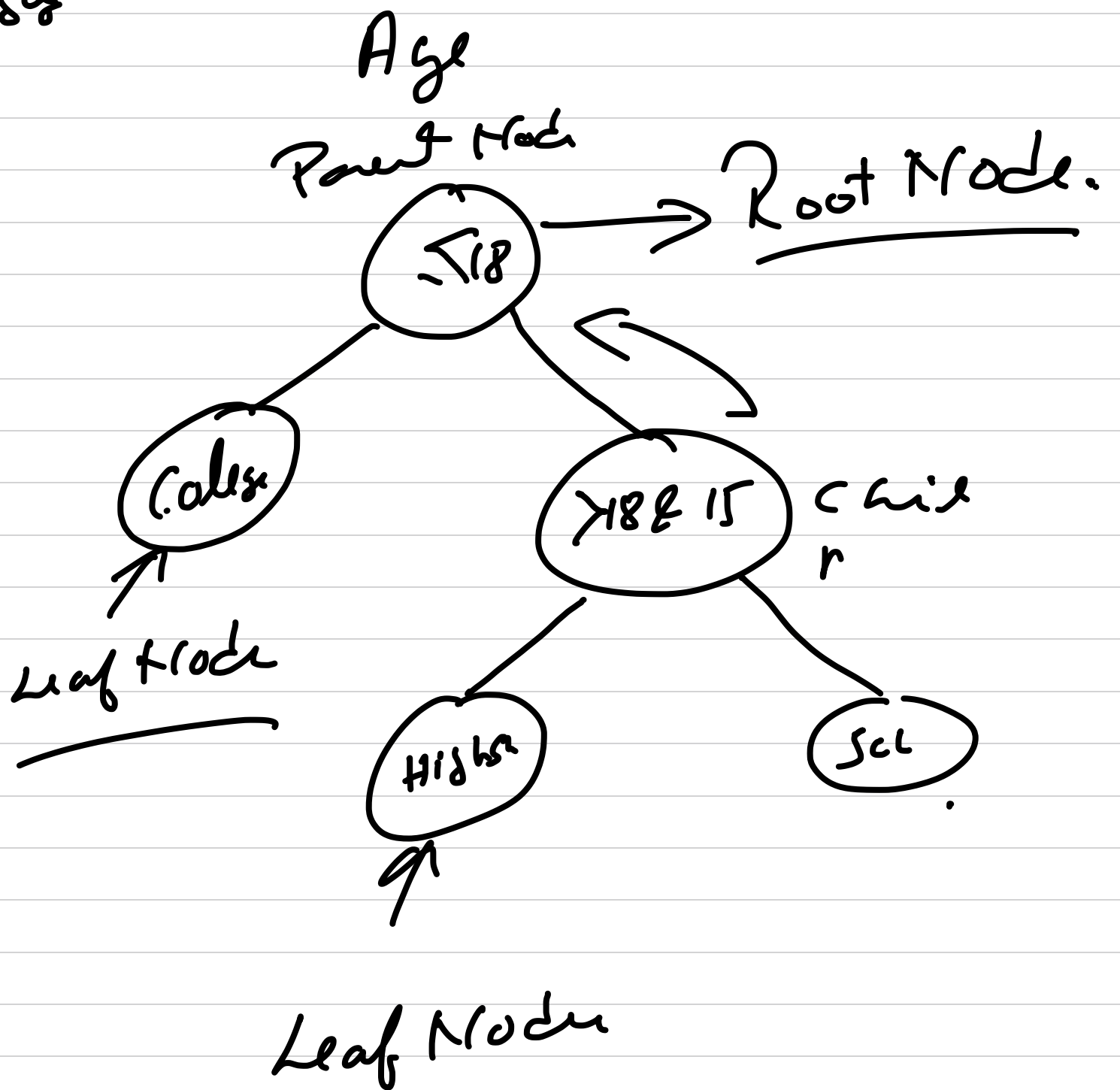
Aintel

- o Managana → ATM

- o Shale → Govt Policy / Plan

# Decision tree.

Terminology



Example

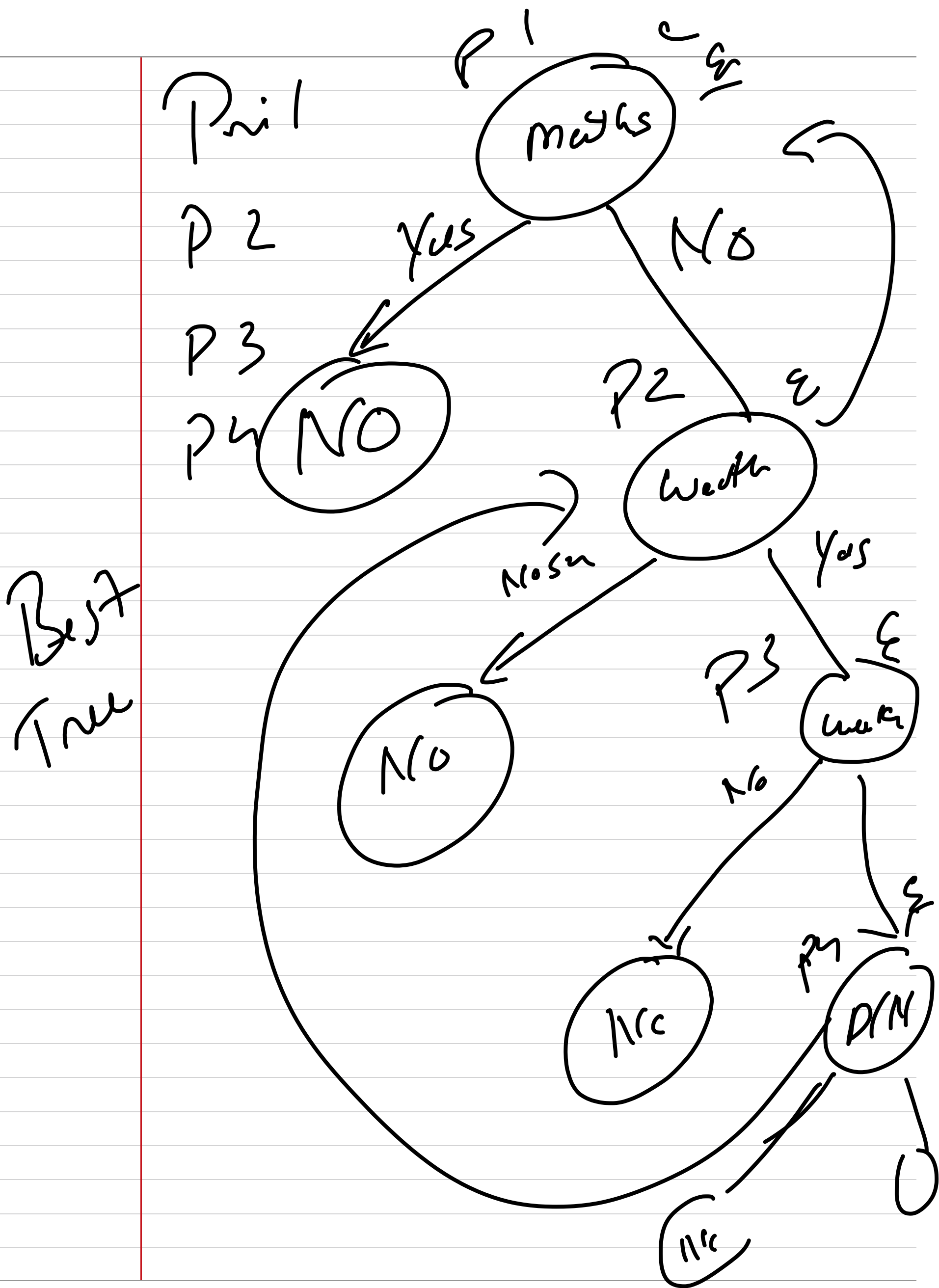
Robin

Q Will Robin go out

Today

mother's

<u>weather</u>	Day / Night	Weekend	Cricket match Y/N
Sunny	Day	Yes	No
Robin is going out			



# Decision Trees:

Maths

1) Entropy

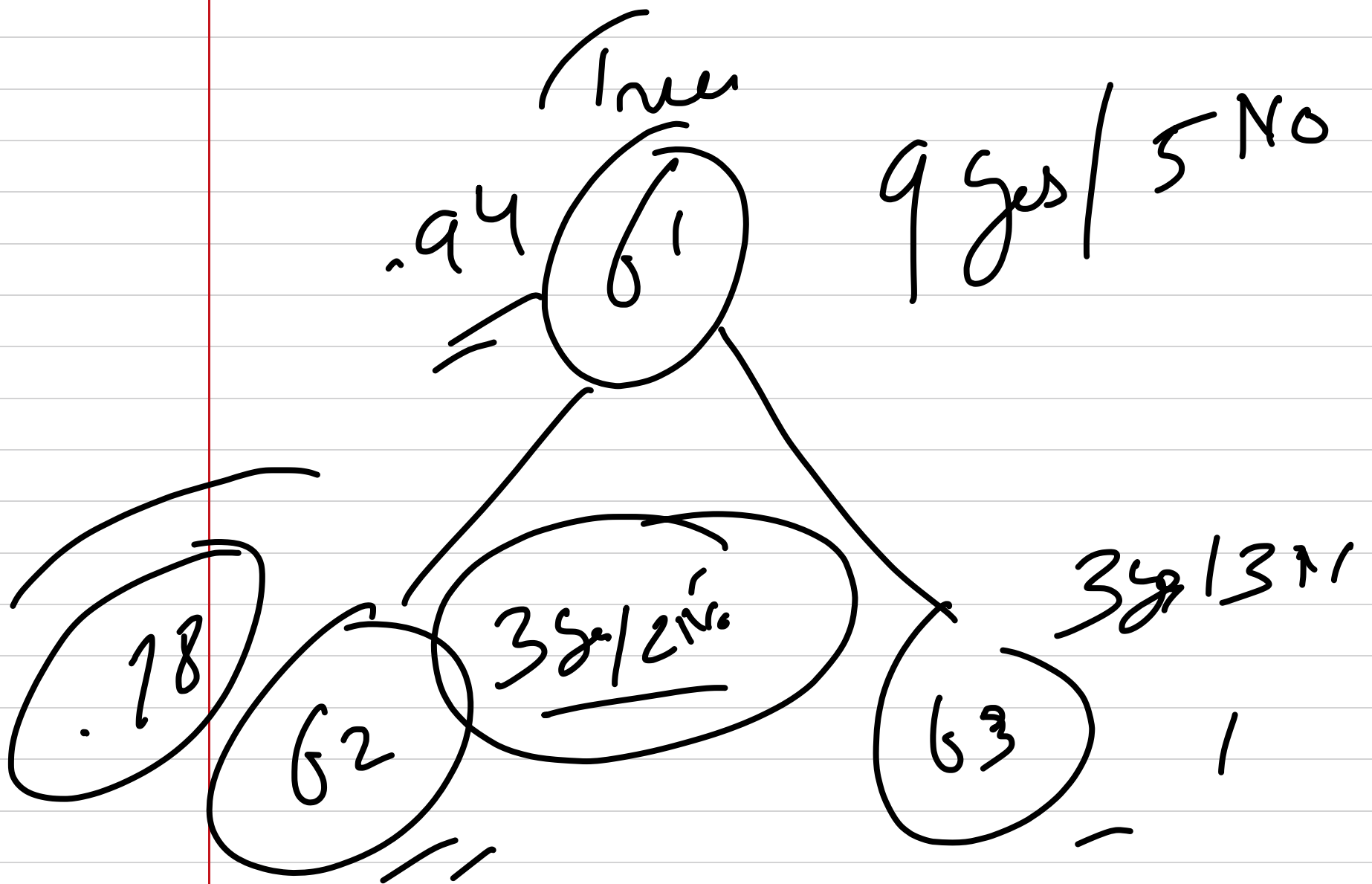
2) Gini Impurity

3) Information Gain

Entropy



# Entropy



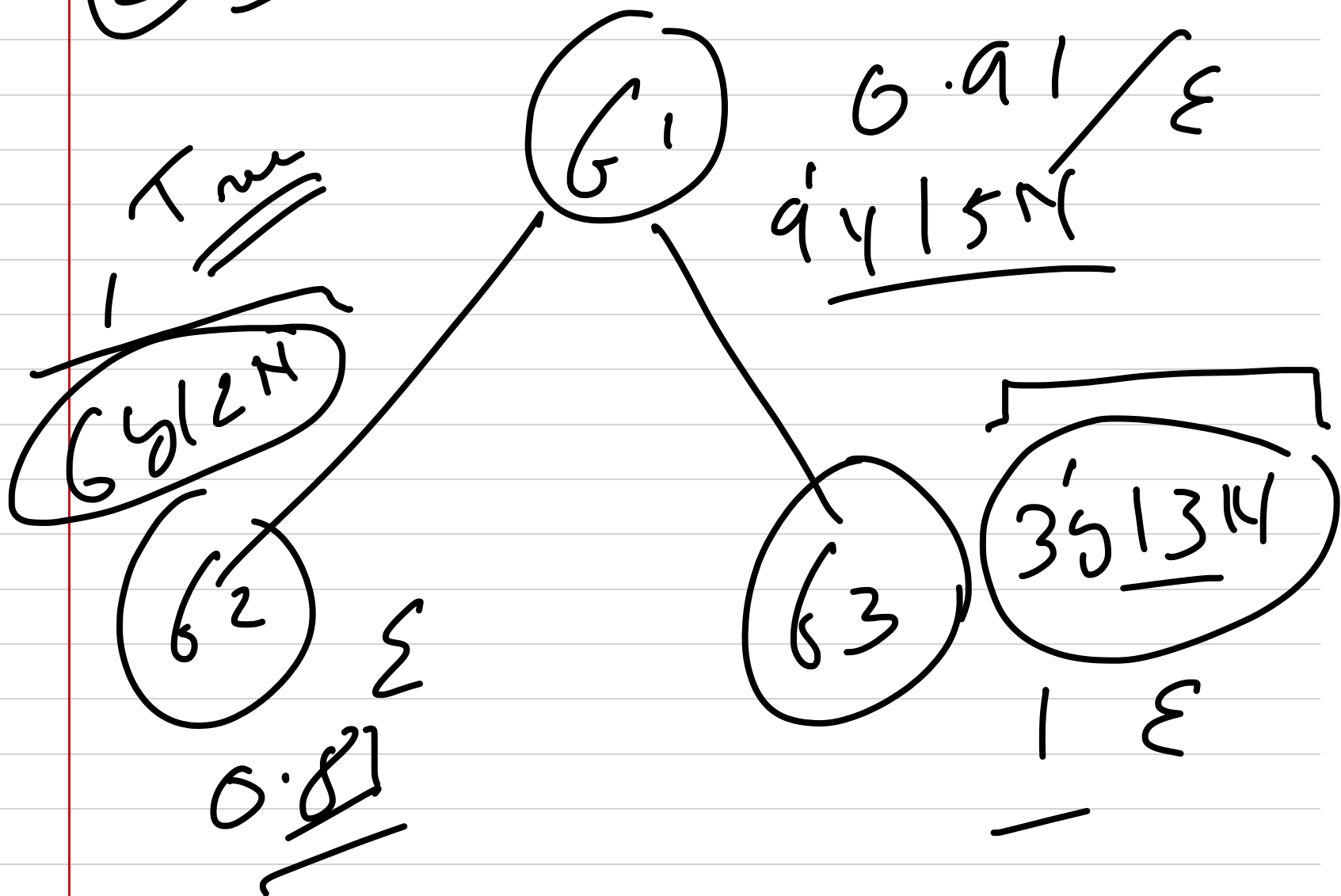
max Entropy

$$H(S) = P_{+} \log(P_{+}) - P_{-} \log(P_{-})$$

$$= \frac{3}{5} \log\left(\frac{3}{5}\right) - \frac{2}{5} \log\left(\frac{2}{5}\right)$$

$$= \underline{\underline{0.78}}$$

## (2) Information Gain



Gain (S, b)

$$= \underline{H(S)} - \sum H(S) \dots H(N)$$

$$= 0.91 - \frac{8}{14} \times 0.81 - \frac{6}{14} \times 1$$

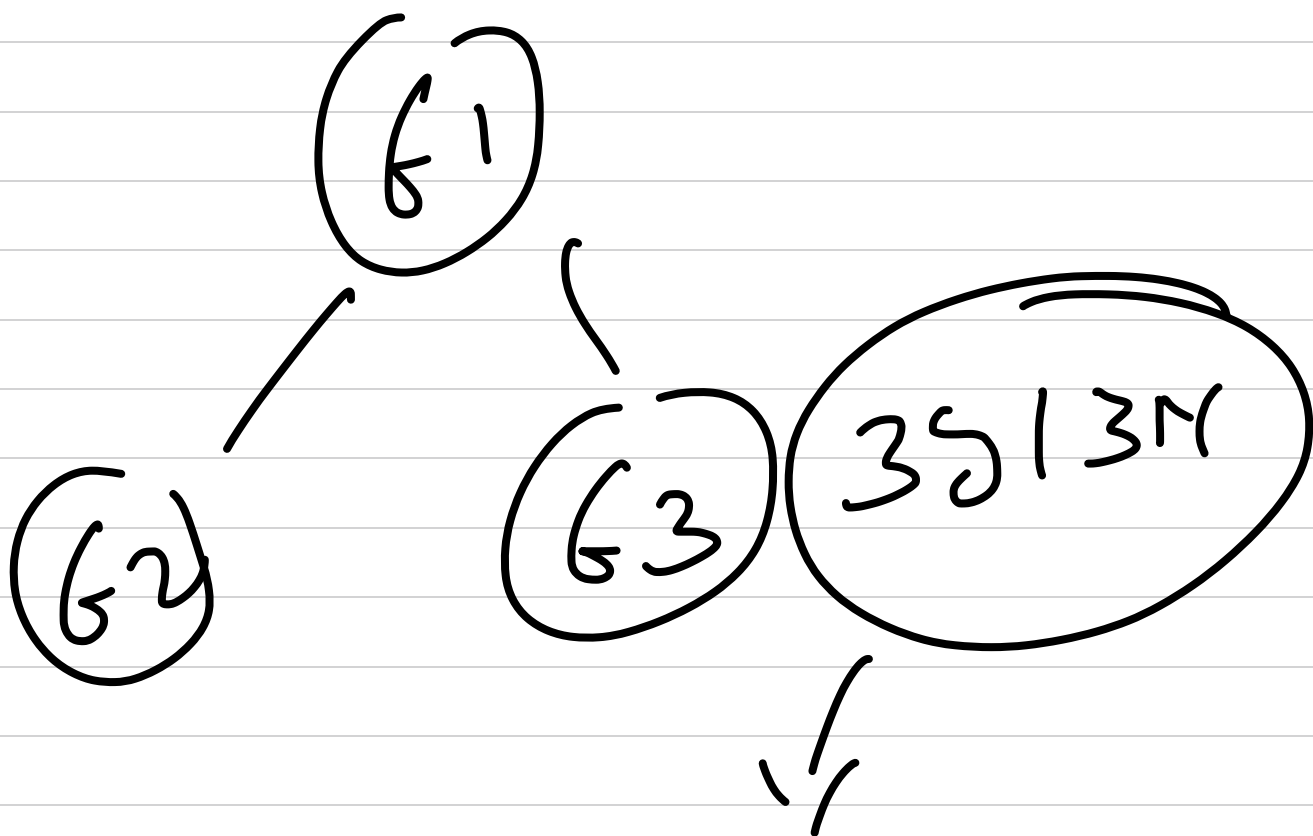
$$= 0.049$$

Highness  
Score

trans

③ Mini Im Punit

$$GI = 1 - \sum_i^n (P_i)^2$$



$$= 1 - \left[ (P_+)^2 + (P_-)^2 \right]$$

$$= 1 - \left[ \left( \frac{3}{6} \right)^2 + \left( \frac{3}{6} \right)^2 \right]$$

$$= 1 - \{ 0.25 + 0.25 \}$$

$$= 1 - 0.5 = \textcircled{0.5}$$

Optimal  $\rightarrow$  Entropy  $\rightarrow$  IG  
 Optic 2  $\rightarrow$  
 $GI \rightarrow IG.$ 
  
 Similar to

?  
 - L.R  
 - L.R  
 - K+IN  
 - NB  
 - SUM  
 - DT

Valid or not?  
 Y  
 Contin (Dis)

Shahid Q

Which model to use and why?

1  
Pragmatic  
model

2  
Non Pragmatic  
model.

∴

DT

math

slow Prob.

∴

Decision tree  
model has a overfit  
issues  
we see in Next model  
how to overcome it.