

PROGRAMMING FUNDAMENTALS

Assignment #01

PROBLEM #01:

Miles per hour to kilometers per second

IPO

INPUT

Speed in
miles per
hour

Speed in
Km per hour

PROCESSING

1) Input Speed in mil/hour

2) Speed in $\frac{\text{mil}}{\text{h}} = \text{speed in } \frac{\text{km}}{\text{h}}$

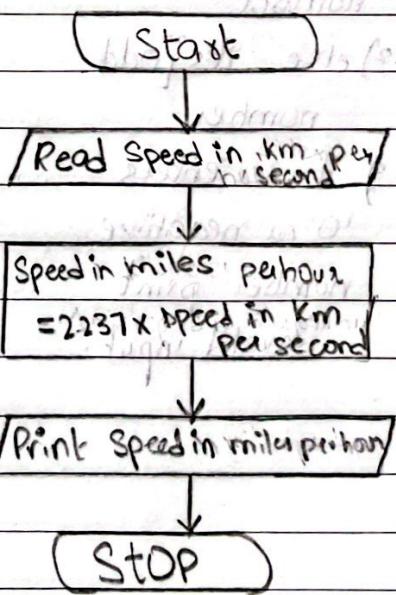
3) Output Print speed in $\frac{\text{km}}{\text{h}}$ mil/hour

OUTPUT

Speed in
kilometers per
hour

Per hour

Flowchart



Pseudo Code:

- 1) START
- 2) INPUT num.
- 3) IF ~~num~~ (num \neq 0)
PRINT " Invalid Input"
- 4) IF (num $\cdot 2 == 0$)
PRINT " EVEN NUMBER"
EISE
PRINT " ODD NUMBER"
- 5) END

PROBLEM #03

legal Age of Marriage in Pakistan

IPO

INPUT

Age
Gender
Province

PROCESSING

1) if province is
sindh AND gender
is male or female
AND age ≥ 18 then
print eligible
else
print not eligible

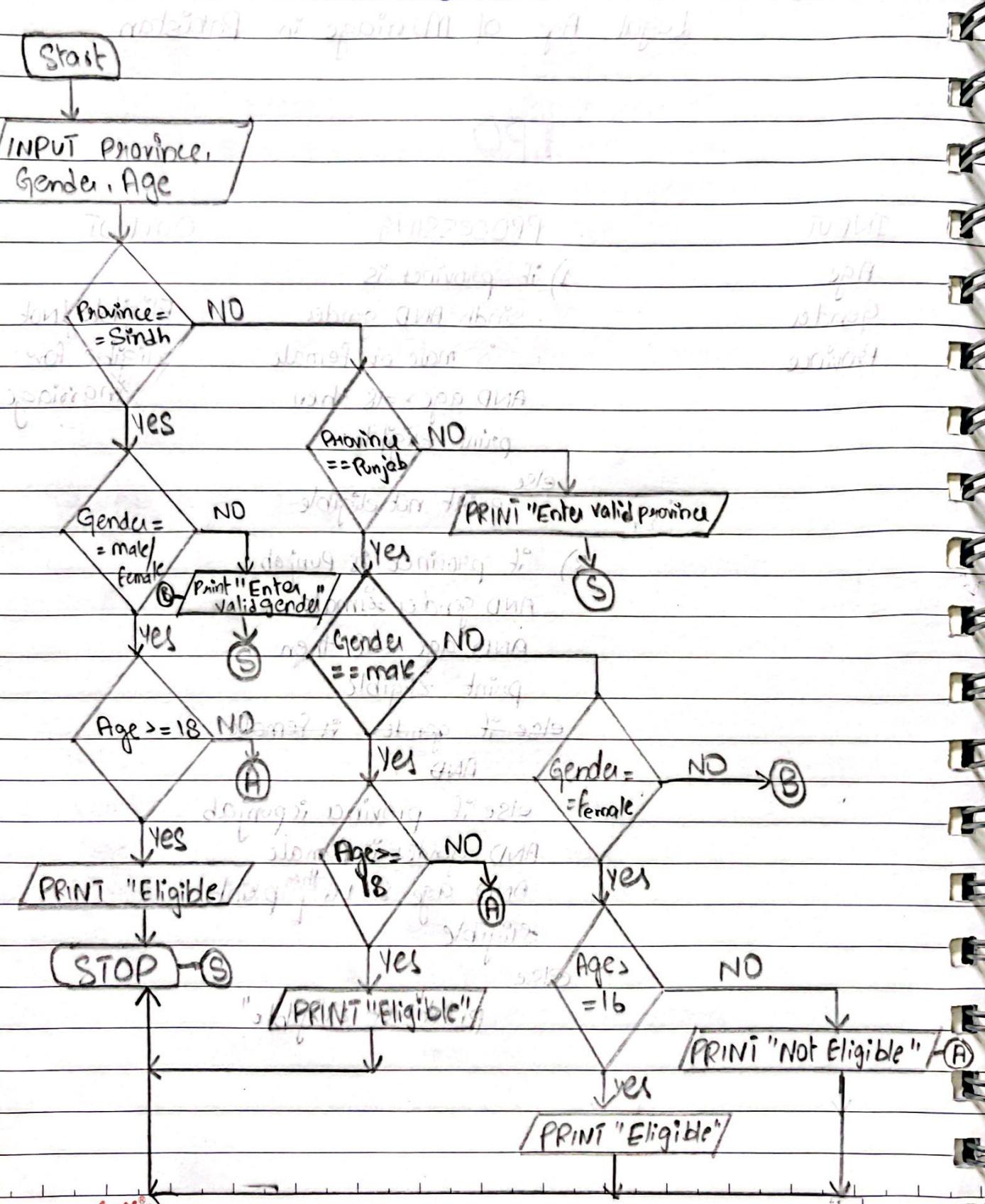
OUTPUT

Eligible / Not
Eligible for
marriage.

2) if province is punjab
AND gender is male
AND age ≥ 18 then
print eligible
else if gender is female
AND
else if province is punjab
AND gender is female
AND age ≥ 16 then
print
eligible
else
print "Not Eligible"



Flow Chart



Pseudo code:

```

1) START
2) INPUT Province, gender, Age
3) IF (Province == Sindh) AND (Gender == male OR female)
   AND (Age >= 18)
   print "Eligible"
else
   print "Not Eligible"
4) IF (Province == Punjab) AND (Gender == male) AND (Age >= 18)
   print "Eligible"
END IF | Province == Punjab) AND (Gender == female) AND
(Age >= 16)
   print "Eligible"
else
   Print "Not eligible"
5) STOP
    
```

PROBLEM #04

Grocery Assistance/calculator

IPO

INPUT

- + money
- * price of onions, apricots
- grapes, and tomatoes
- * kg. of each vegetable bought

PROCESSING

- 1) price of onion = price of 1kg onion * Kg of onion bought
- 2) price of apricot = price of 1 kg apricot * kg of apricot bought
- 3) price of grape = price of 1kg grape * Kg of grape bought

OUTPUT

money to pay
change



4) price of tomatoes = Price of 1kg tomato
 \times kg of tomatoes bought

5) total amount = price of onion

+ price of apricot

+ price of grapes

+ price of tomatoes

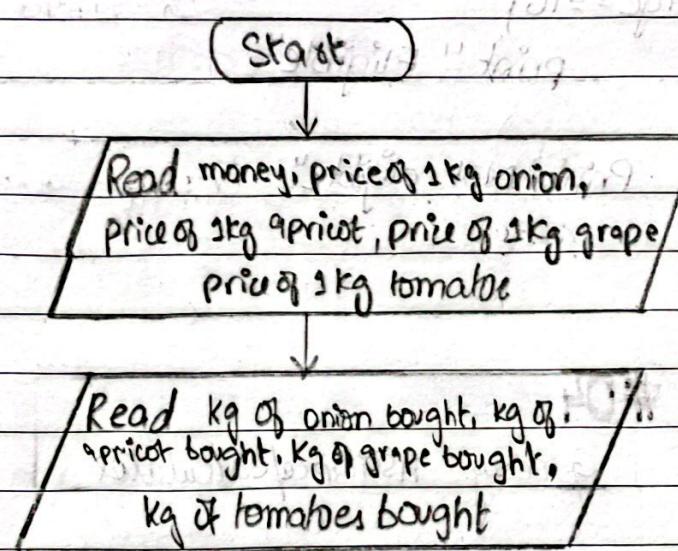
6) if money \leq total amount

PRINT "Insufficient balance".

7) change = $\frac{\text{money} - \text{total amount}}{\text{total amount}}$

8) PRINT total amount, change

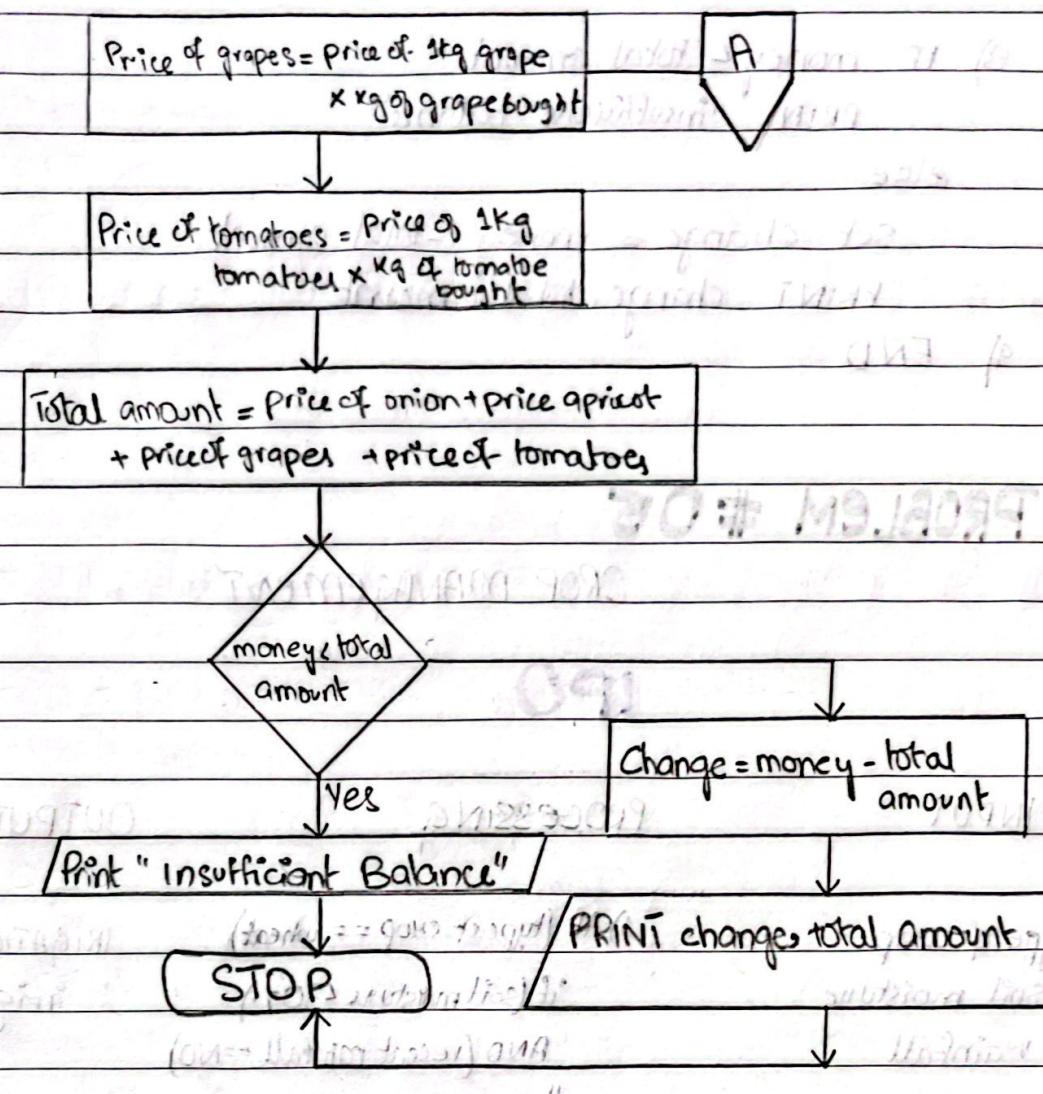
Flowchart



Price of onion = price of 1kg onion \times
 $\quad \quad \quad$ kg of onion bought

Price of apricot = price of 1kg apricot
 \times kg of apricot bought





Pseudo Code:

- 1) START
- 2) Read money, price of 1kg onion, price of 1kg apricot, price of 1kg grape, price of 1kg tomato, kg of onion bought, kg of apricot bought, kg of grape bought, kg of tomato bought
- 3) Set price of onion = price of 1kg onion x kg of onion bought
- 4) Set price of apricot = price of 1kg apricot x kg of apricot bought
- 5) Set price of grape = price of 1kg grape x kg of grape bought
- 6) Set price of tomato = price of 1kg tomato x kg of tomato bought
- 7) Set total amount = price of onion + price of apricot + price of grape + price of tomato.



```

8) IF money < total amount
    PRINT "insufficient balance"
else
    set change = money - total amount
    PRINT change, total amount
9) END
    
```

PROBLEM #05

CROP MANAGEMENT

IPO

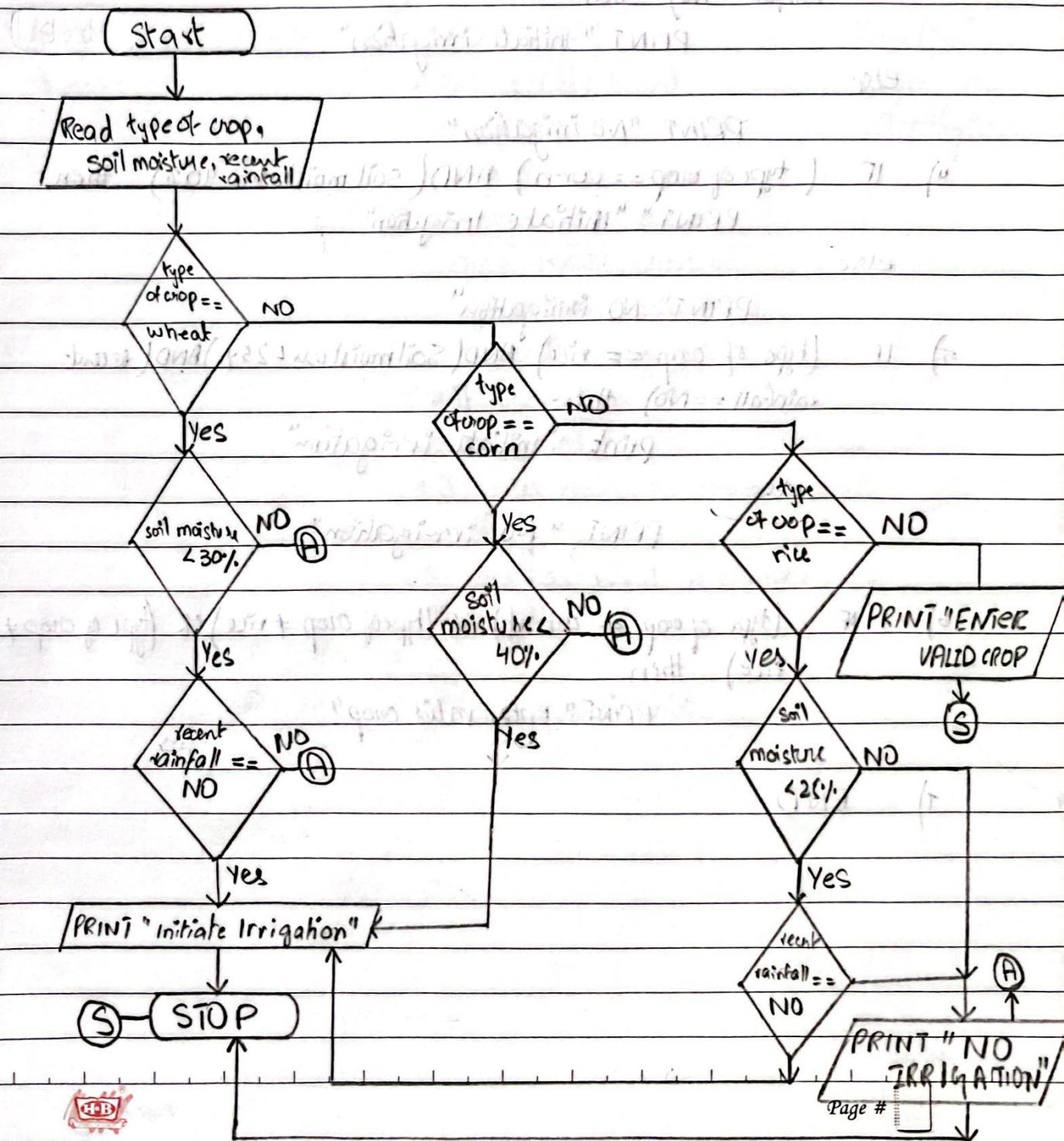
INPUT	PROCESSING	OUTPUT
type of crop	1) if (type of crop == wheat)	IRRIGATION, NO
soil moisture	if (soil moisture < 30%)	irrigation.
recent rainfall	AND (recent rainfall == NO) then	
	PRINT "initiate irrigation"	
	else	
	PRINT "NO irrigation"	
	2) if (type of crop == corn)	
	if (soil moisture < 40%) then	
	PRINT "initiate irrigation"	
	else	
	PRINT "No irrigation"	
	3) if (type of crop == rice)	
	if (soil moisture < 25%) AND	
	if (recent rainfall == NO) then	
	PRINT "initiate irrigation"	



else

PRINT "NO irrigation"

Flowchart



Pseudo Code

1) START

2) INPUT type of crop, ^{soil} moisture, recent rainfall

3) IF (type of crop == wheat) AND (soil moisture < 30%) AND (recent rainfall == NO) then

 PRINT "Initiate irrigation"

else

 PRINT "NO irrigation"

4) IF (type of crop == corn) AND (soil moisture < 40%) then

 PRINT "Initiate Irrigation"

else

 PRINT "NO irrigation"

5) IF (type of crop == rice) AND (soil moisture < 25%) AND (recent rainfall == NO) then

 PRINT "Initiate irrigation"

else

 PRINT "NO irrigation"

6) IF (type of crop != wheat) OR (type of crop != rice) OR (type of crop != rice) then

 PRINT "Enter valid crop!"

7) END

Problem : 6

Amusement Park Ride eligibility

IPO

INPUT

height
Age
Ride

PROCESSING

- * Select Ride based on input.
- * If user choose dragon roller coaster check height should be greater than equal to 48 inches & age > 10 .
- * If user choose sky swing check if height ≥ 54 inches
- * If user choose the carousel check if age ≥ 5 .
- * If user has band he can take infinite rides
- * Else choose valid ride.

OUTPUT

Eligible or
not eligible.



start

Read Age, height, ride, band

Date 20
M T W T F S SNO
band == true

YES

Print "unlimited
rides"Ride == Dragon
Roller coaster

YES

Age >= 10
heights =
46 inchPrint "You ARE
NOT Eligible" (A)Ride == gray
swing

NO

YES

Ride == Caramel

YES

Print "invalid input"

Print "You ARE Eligible"

STOP

NO, height
>= 58
inch

Print "YOU ARE ELIGIBLE"

Age >= 5

YES



Page #

PSEUDO CODE:

- 1) Start
- 2) INPUT Age, height, ride, band
- 3) if ride == Dragon Roller coaster AND Age ≥ 10 AND height ≥ 48 inch
then PRINT "YOU ARE ELIGIBLE". else PRINT "YOU ARE
NOT ELIGIBLE".
- 4) ~~else~~ END IF ride == Sky Swing AND height ≥ 58 inch THEN
PRINT "YOU ARE ELIGIBLE" else PRINT "YOU ARE NOT ELIGIBLE".
- 5) END IF ride == Carrousel AND Age ≥ 5 then PRINT
"YOU ARE ELIGIBLE" else PRINT "YOU ARE NOT ELIGIBLE".
- 6) ELSE PRINT "INVALID INPUT".
- 7) IF (band == Yes) then PRINT "INFINITE RIDES".
- 8) END

PROBLEM 7:

WHICH FLOOR

IPO

Input

7 digit number
comprising only
0's and 1's.

Processing

- 1) if the num = 1111110
then Print "Floor is 0".
- 2) else if num = 0110000
then print "Floor is 1".
- 3) else if num = 1101101
then print "Floor is 2".
- 4) else if num = 1111001
then print "Floor is 3".

Output

single digit
number telling
floor number

5) else if num == 0110011

then print "Floor is 4".

6) else if num == 1011011

then print "Floor is 5".

7) else if num == 1011111

then print "Floor is 6".

8) else if num == 1110000

then print "Floor is 7".

9) else if num == 1111111

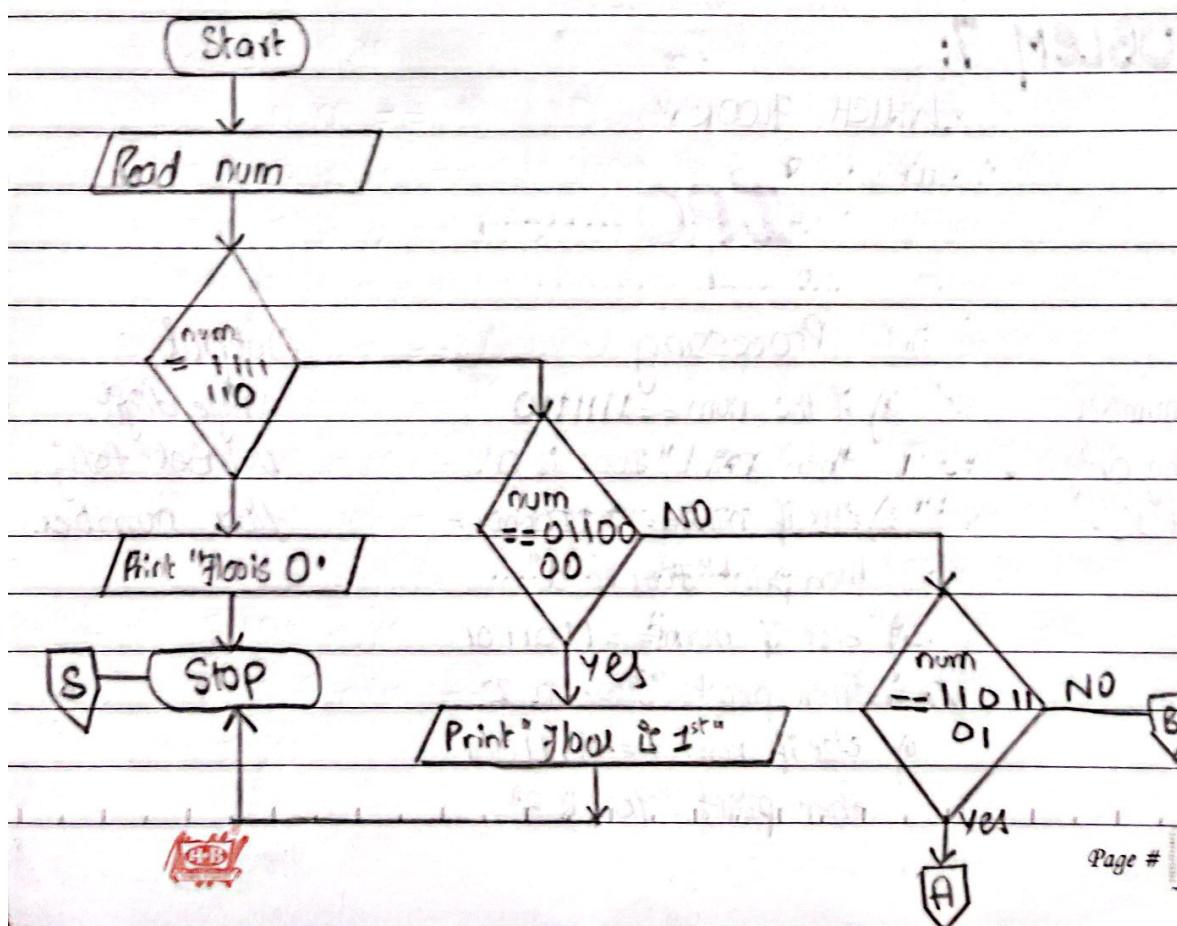
then print "Floor is 8".

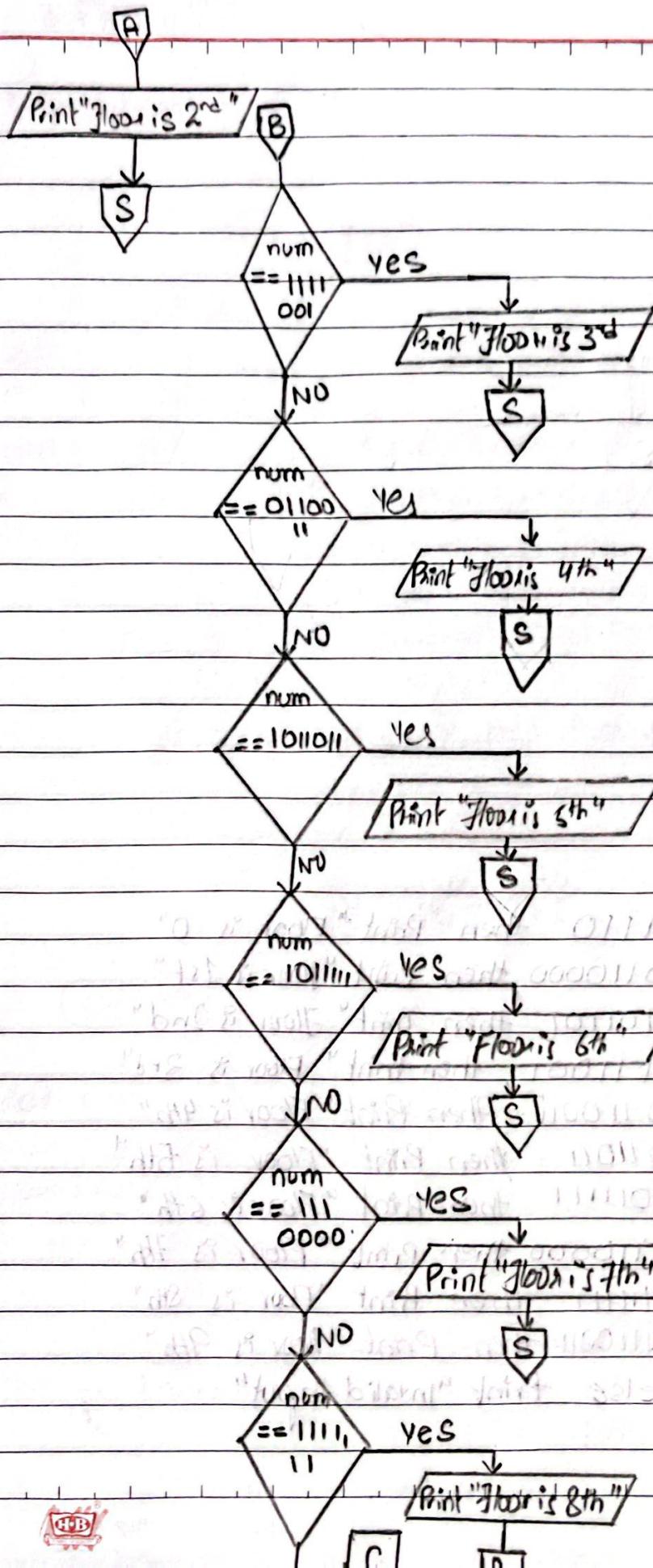
10) else if num == 1110011

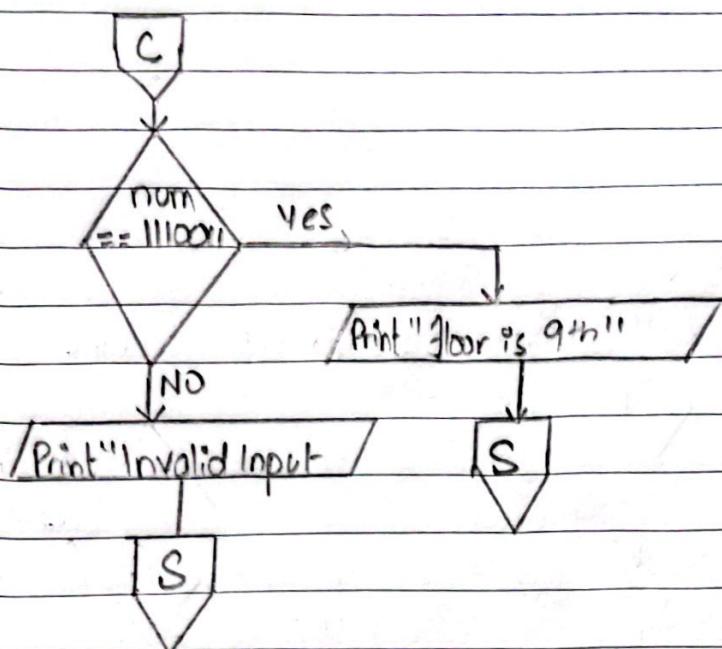
then print "Floor is 9".

11) else print "invalid input".

Flowchart







PSEUDO CODE:

- 1) START
- 2) Read num
- 3) if num == 1111110 then Print "Floor is 0"
- 4) ENDIF num == 0110000 then Print "Floor is 1st"
- 5) ENDIF num == 1101101 then Print "Floor is 2nd"
- 6) ENDIF num == 1111001 then Print "Floor is 3rd"
- 7) ENDIF num == 0110011 then Print "Floor is 4th"
- 8) ENDIF num == 1011011 then Print "Floor is 5th"
- 9) ENDIF num == 1011111 then Print "Floor is 6th"
- 10) ENDIF num == 1110000 then Print "Floor is 7th"
- 11) ENDIF num == 1111111 then Print "Floor is 8th"
- 12) ENDIF num == 1110011 then Print "Floor is 9th"
- 13) ENDIF num == else Print "Invalid input"
- 14) END



Problem: 8

Digit Sum

IPO

Input

Processing

Output

num

?

* num/10 to get the
last digit of number &
same value in sum.

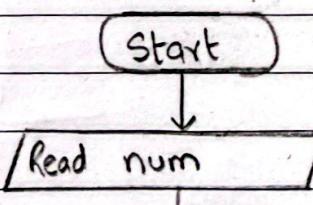
* ~~num~~ num/10 and
num/10 to get last
digit, store it in ~~num~~.

* Repeat until num
becomes zero

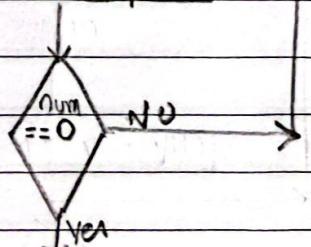
* Print sum.

Sum of digits

Flow Chart



Sum = num/10
sum + num
num = num/10



Print sum

Page #

PSEUDO CODE:

- 1) Start
- 2) INPUT num
- 3) Repeat till num becomes zero ($num = 0$)
 - set sum = num \cdot 10
 - Set sum \leftarrow num
 - $num = \overline{num} / 10$
- 4) PRINT num
- 5) END



PROBLEM: 9

IPO

INPUT

Birth year
 Birth month
 Birth day
 current year
 current month
 current year

PROCESSING

```
* if !(current year > birth year)
    if (current month > birth month)
        if (current day > birthday)
            then, days = current day - birthday
        else if (birthday > current day) then
            days = birthday - current day
        else if (birthday == current day) then
            days = 0
    else
        print("invalid input");
```

OUTPUT

Age

months = current month - birth month

years = current year - birth year

else if (birth month > current month)

```
if (current day > birthday)
    if (30 - current day > birthday)
        days = current day - birthday
    else if (30 - current day - birthday > 0)
        days = (30 - current day) - birthday
    months = 12 - birth month - current month
else
    print("invalid input");
```

else if (birthday > current day)

```
days = 30 - birthday + current day
months = 12 - (birth month - current month)
- 1
```



```

else if (birthday == current day)
    day = 0
    months = 12 - Birthmonth - current month
else
    print("invalid input");
    
```

$$\text{years} = \text{current year} - \text{birth year} - 1.$$

```

else if (Birth month == current month)
    if (current day > birthday)
        days = current day - birthday
        years = current year - birth year
    else if (birthday > current day)
        days = birthday - current day
        years = current year - birth year - 1
    else if (birthday == current day)
        days = 0
        years = current year - birth year
    else
        print("invalid input");
    months = 0
    
```

```

else if ( birthyear == current year)
    if ( current month > birth month )
        if ( current day > birth day )
            days = current day - birth day
        else if ( birth day > current day )
            days = birth day - current day
        else if ( birth day == current day )
            days = 0
        else
            print("invalid input")
    months = current month - birth month
    
```



```

else if ( birth month == current month)
    if (current day > birthday)
        days = current day - birthday
    else if ( current day == birthday)
        days = 0
    else
        print("invalid input")
months = 0
years = 0
else
    print("invalid input")
print(days, months, years.)
    
```

Pseudo Code

- 1) START
- 2) INPUT Birth year, birth month, birth day, current year, current month, current day
- 3) IF (current year > birth year)
 - if (current month > birth month)
 - if (current day > birthday) then
 days = current day - birthday
 else if (birthday > current day) then
 days = birthday - current day
 else if (birthday == current day) then
 days = 0
 - else
 print "invalid input"
 months = current month - birth month
 years = current year - birth year
 - else if (birth month > current month)
 - if (current day > birthday)



Date 20
M T W T F S S

ELSE IF (~~if~~ if (30 - birthday + currentday > 0)

days = 30 - birthday + currentday

months = 12 - (currentmonth -

months = 12 - (birthmonth - currentmonth) - 1

else if (30 - birthday + currentday < 0)

days = 0

months = 12 - birthmonth - currentmonth

else

print("invalid input").

years = current year - birth year - 1

ELSE IF (Birthmonth == Currentmonth)

if (currentday > birthday)

days = current day - birth day

years = current year - birth year

else if (birthday > current day)

days = birth day - current day

years = current year - birth year - 1

else if (birthday == currentday)

days = 0

years = ~~current~~ current year - birth year

else

print("invalid input")

months = 0



Page #

```
ELSE IF ( Birthyear == current year )
    if ( current month > birthmonth )
        if ( current day > birthday )
            days = current day - birthday
        else if ( birthday > current day )
            days = birthday - current day
        else if ( birthday == current day )
            days = 0
    else
        print "invalid input"
months = current month - birthmonth
years = 0
```

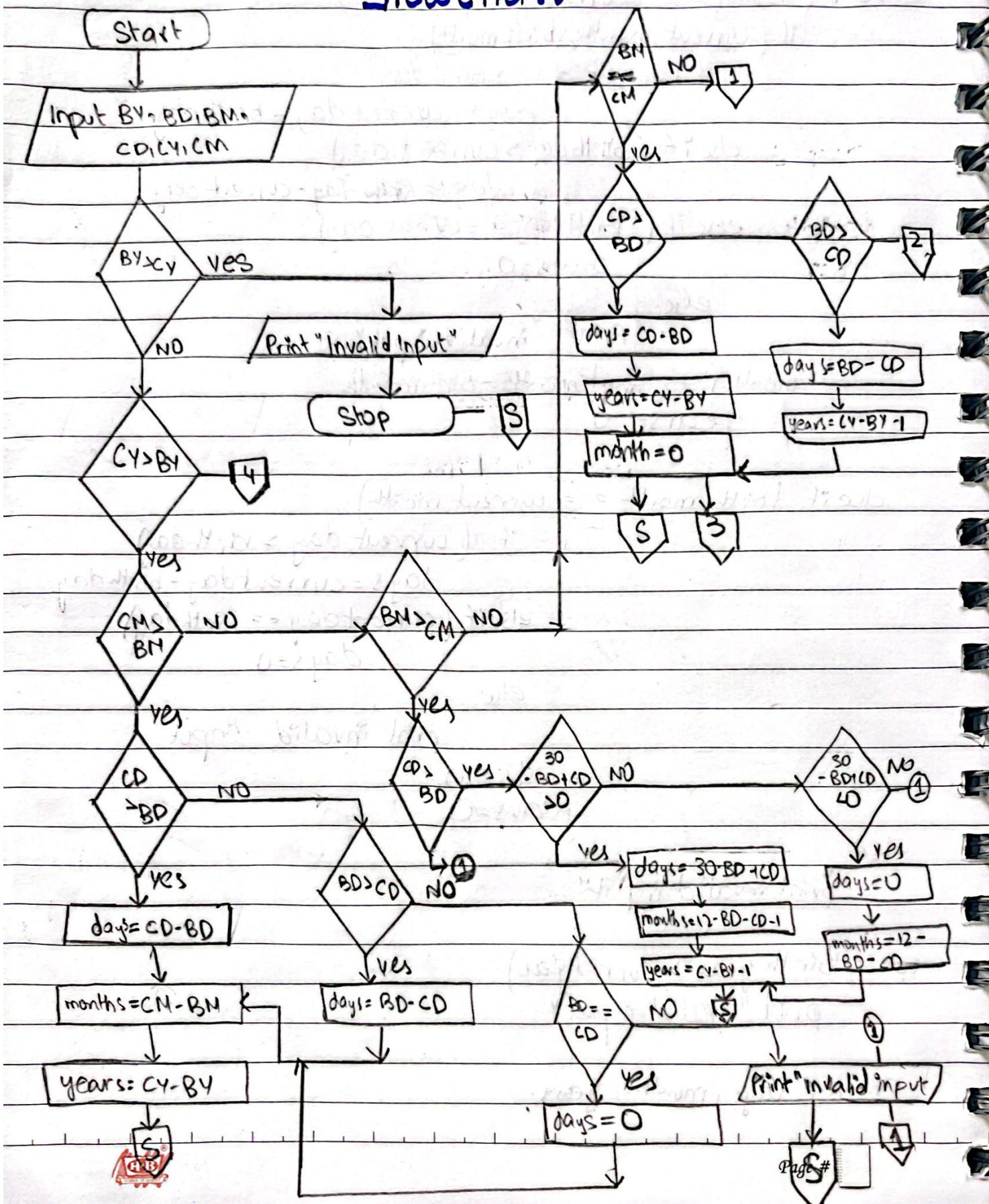
```
else if ( birth month == current month )
    if ( current day > birthday )
        days = current day - birthday
    else if ( current day == birthday )
        days = 0
    else
        print "invalid input"
months = 0
years = 0
else
    print "invalid input"
```

```
If ( birth year > current year )
    print "invalid input"
```

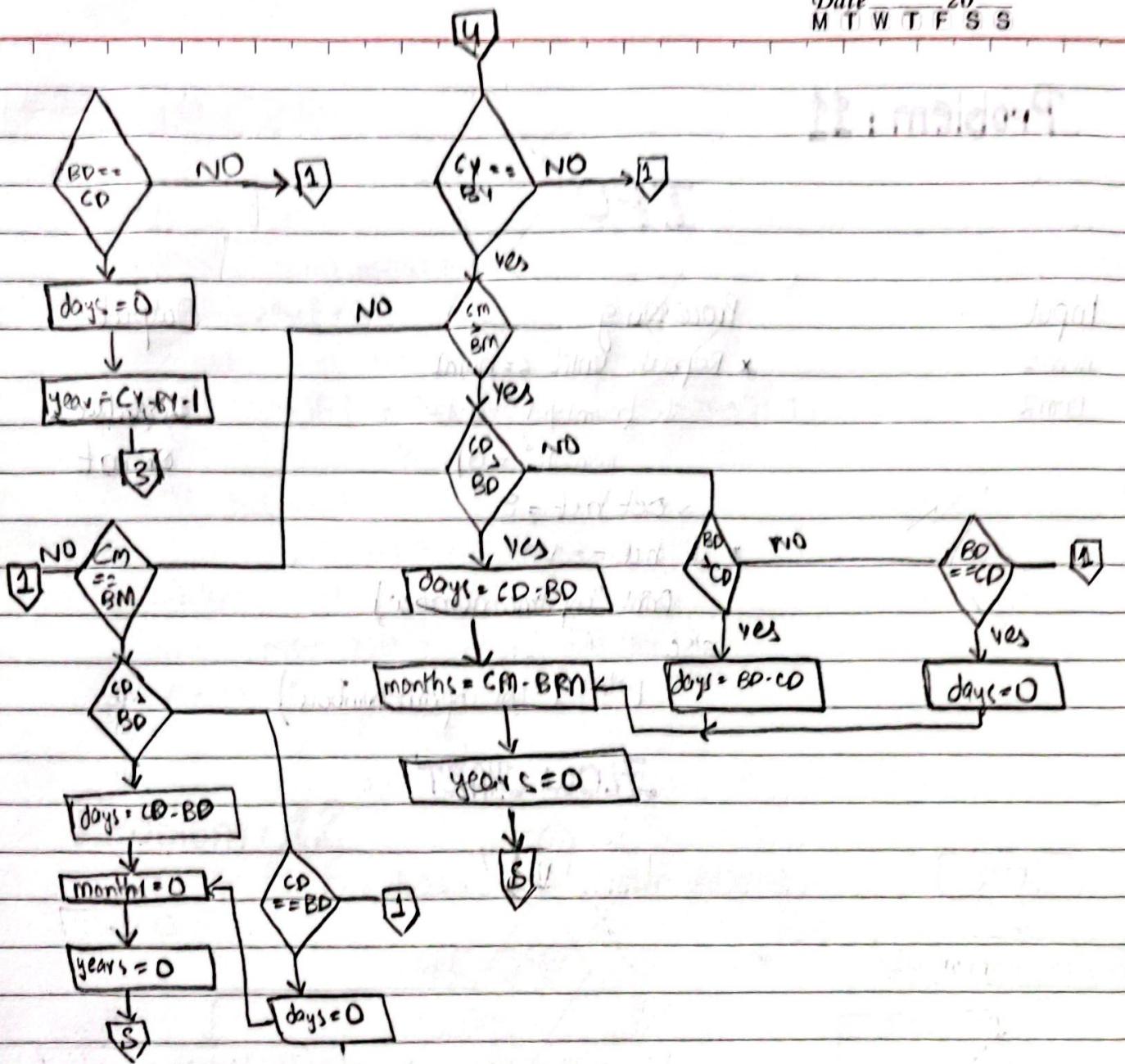
PRINT days, months, years.



Flowchart



Date 20
 M T W T F S S



Problem 10

Poor Mr. Bhola bought a faulty keyboard

IPO

INPUT

number

PROCESSING

* Set CN = 0, inc = 1, a = 0

* Repeat until (n > 0)

a = n % 10

n = n // 10

if (a == 0) If (n % 10 == 9), Go to

repeat

else

CN = CN + (a * inc)

inc = inc * 10

OUTPUT

processed
number without
fault

Standard

Pseudo Code : 1) start

2) INPUT number (n)

3) Set connected number(CN) = 0, inc = 1, a = 0

4) Repeat until (n > 0)

a = n % 10

a = n // 10

if (a == 0) If (n % 10 == 9), go to step 4 e

else

CN = CN + (a * inc)

inc = inc * 10

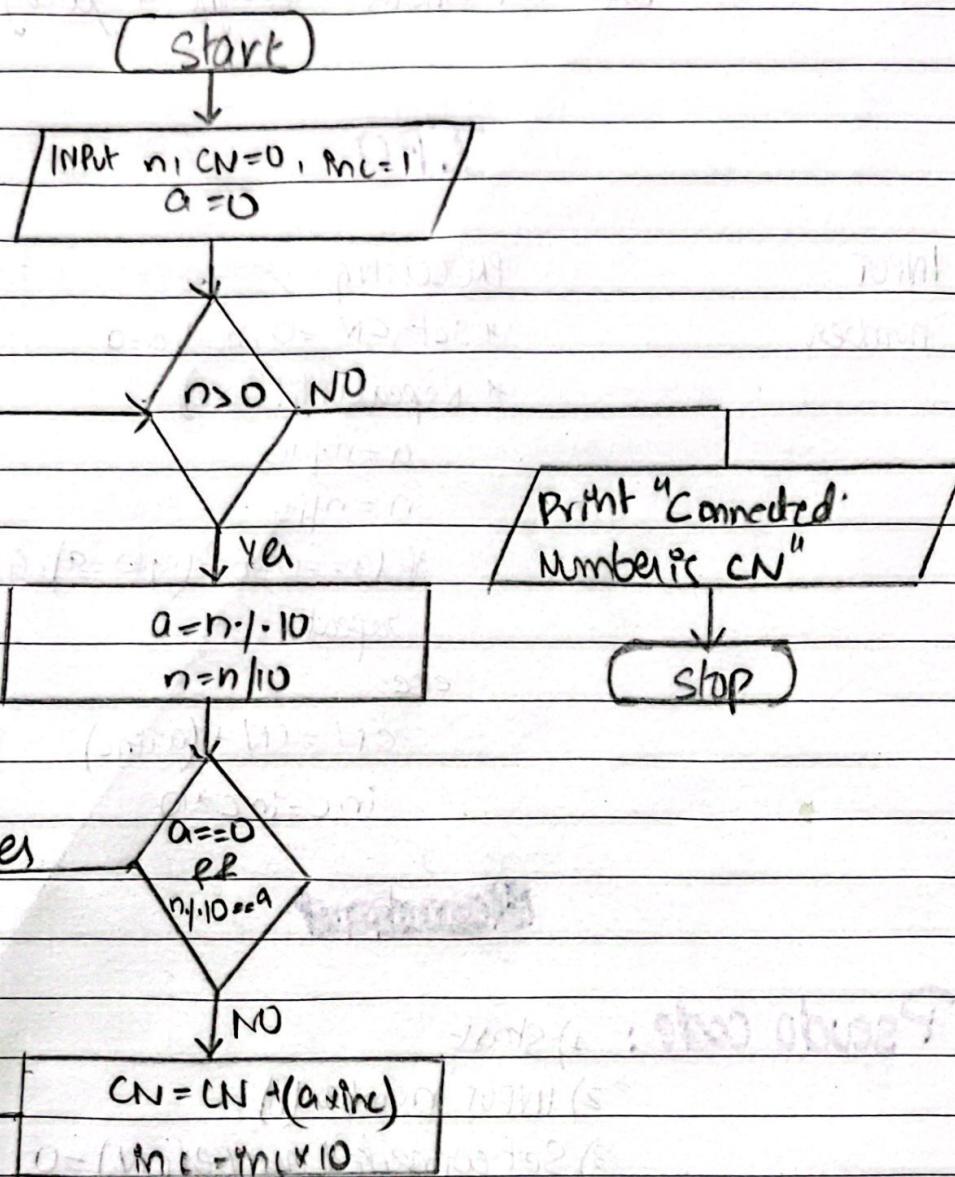
5) Print CN

6) END



Page #

Flowchart



Problem : 11

IPO

Input

num1
num2

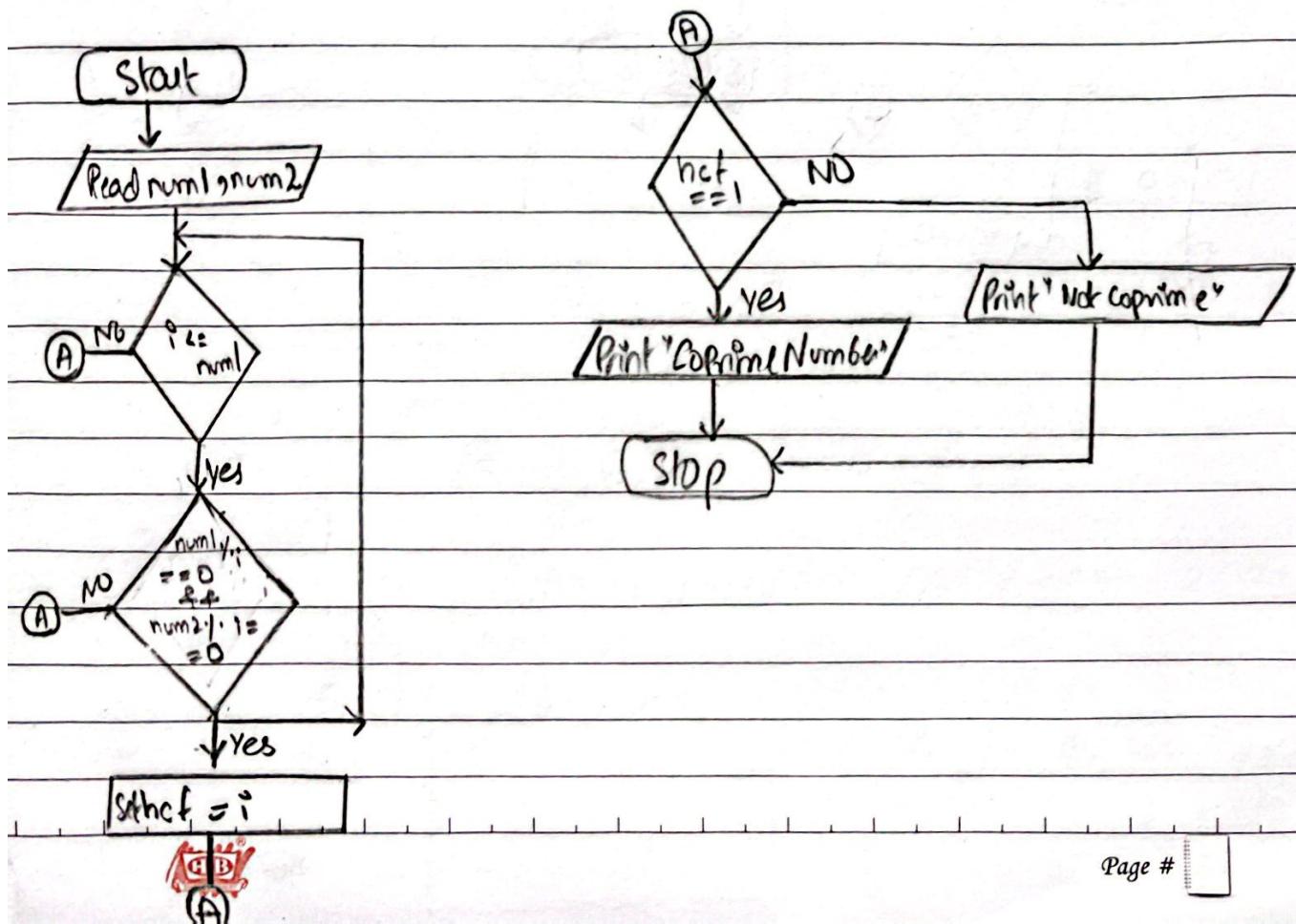
Processing

- * Repeat until $L = \text{num}1$
- if $(\text{num}1 \cdot i == 0 \text{ & } \text{num}2 \cdot i == 0)$
- set hcf = 0
- if $\text{hcf} == 1$
- Print "coprime number"
- else
- Print ("Not coprime numbers")

Output

Cofactor
OR not

FLOW CHART



Pseudo Code:

- 1) Start
- 2) INPUT num1, num2
- 3) Set i=1, hcf=0
- 4) Repeat until i = num1
 - if (num1 % i == 0 & num2 % i == 0)
 - hcf = i
- 5) if hcf == 1
 - print "Coprime Numbers"
 - else
 - print "Not coprime numbers")
- 6) END

Problem: 12

Die hard, Defuse the BOMB

IPO

Input

Processing

Output

5 ltr jug

* initially fill 5L jug

4 ltr of measured

3 ltr jug

and pour into 3L jug

water

unlimited water

* Now empty 3L jug

and pour again remaining

2L in 3L jug to 3L jug

* Now fill 5L jug and

pour 1L into 3L jug

* Now you will have

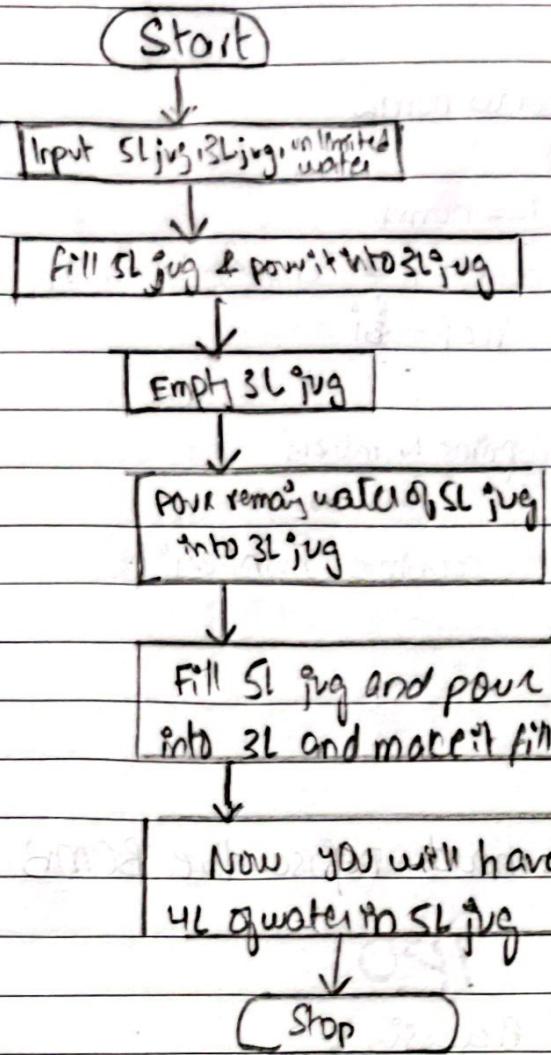
4L of water in

5L jug.



Page #

Flow Chart



Pseud code:

- 1) START
- 2) INPUT 5L jug, 3L jug ,unlimited water .
- 3) Fill 5L jug and pour into 3L jug
- 4) empty 3L jug & pour remain water from 5L jug to 3L jug
- 5) fill 5L jug and pour into 3L jug to fill it
- 6) Now you will have exactly 4L in 5L jug
- 7) END



Problem 13

The general $N \times M$ size dice handwriting problem

IPO

Input

N (number 1)

M (number 2)

Process

* Repeat until $\{ i \leq N$
 $\text{and } i \leq M \}$

if $|N \cdot i| = 0 \text{ and } |M \cdot i| = 0$

then $\text{gcd} = i$

~~exit~~

$\text{gcd} = q \cdot i \cdot \text{if } (M > N)$

* ~~endif if (gcd = 0) then~~

* Print (Any possible multiples of
 gcd till N can be calculated)

* else if ($N \neq M$)

Print ("Any possible multiple of gcd
till N can be calculated")

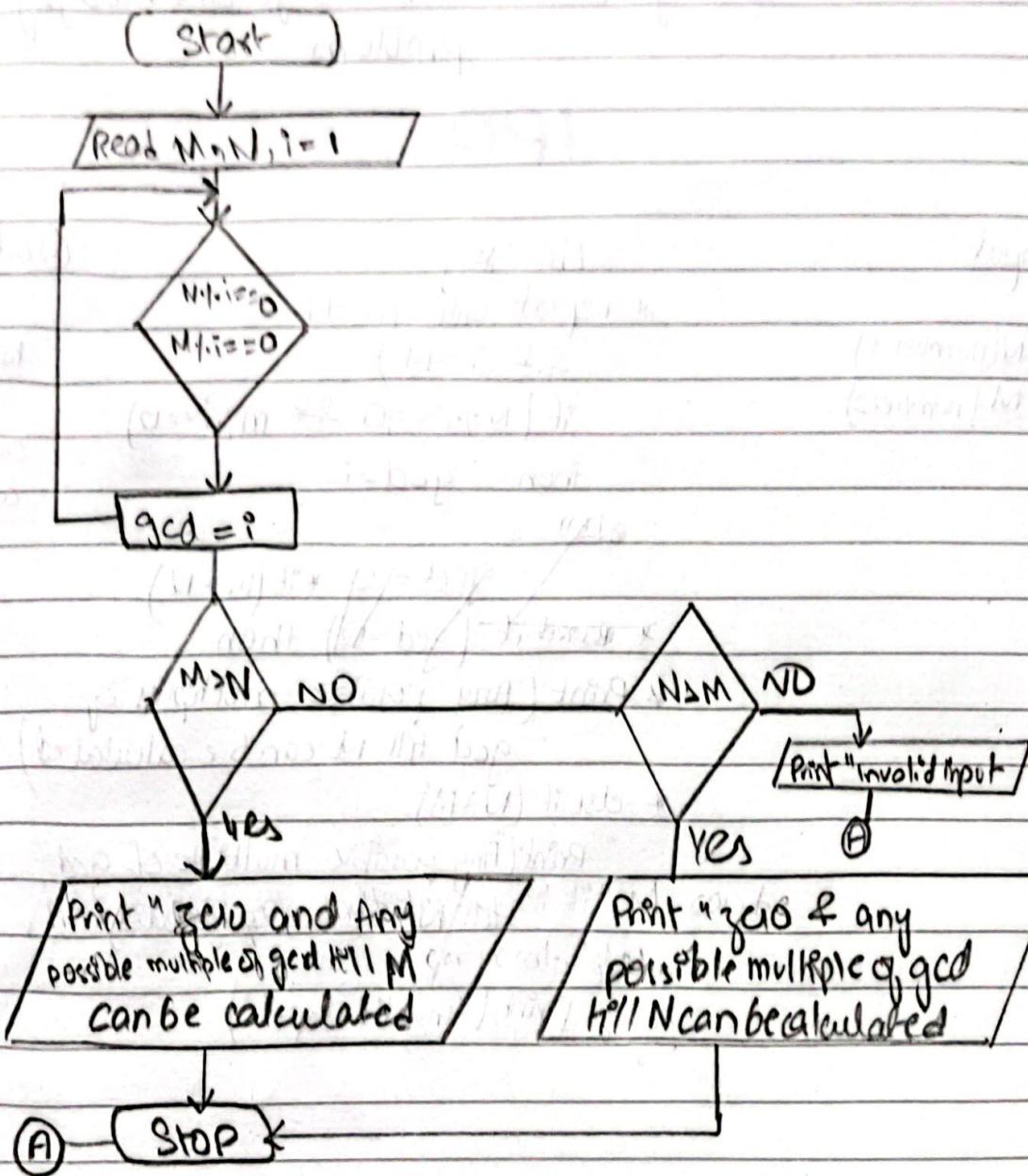
* else

Print ("invalid input")

Output

Number of
possible
outcomes that
can be
calculated

Flowchart



Pseudo Code

1) Start

2) INPUT M, N,

3) Set i = 1, gcd = 0

4) Repeat until $i \leq N$ & $i \leq M$

if $N \% i == 0$ & $M \% i == 0$

then $gcd = i$

5) If $M > N$

then Print zero and any possible multiple of
gcd till M can be calculated

6) If $N > M$

Print zero and any possible multiple of gcd
till N can be calculated

7) Stop