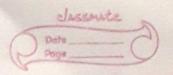
## Unit: 2: Integers and Matrices



This area of discrete monthematics belongs to the area of Number Theory. Number theory is a branch of mathematics that explores integers and their properties.

Integers:

> z integes {----, -2-1,0,1,2 --- } -> z+ positive integes & 1,2, --- 3

Nymber theory has many application within Computer Science, including:

- Storage and Organization of closed - Encay phion - Error correcting codes - Random number generations

Assume 2 integers 2 and 5 such that 2 to (2 is not equal to 0). We say that 2 divides b if there is an integer c such that 5=2c. If 2 divides b we we say that 2 is a factor of 6 and that b is multiple of 2.

· The fact that a divides b is denoted as alb.

Eg: 4/24 True av False? True v · 9 is 9 factor of 29 · gred C=6 · 29 is 9 multiple of 9

· 317 True on False? False X

Sur refermine whether 517 and whether 4/16. Mere 5th Since 7/5 is not go integer.
On the other hand, 4/16 because 16/4 ls 9 integer. The orem: Let 9,5 and ( be integer. Then 1 if 31b and 31c, then 31 (b+0: proof: Here alband 31c, so by the definition of divisibility we can say that there are intoges Pand 9 such that: 5=9p and c=99 vee can unite Now, we can unite b+c = 9p + 99 i. e b+c = 9(p+9) So, from this we can say that a divides 5+C. Wifalb, then albo for all integes c; Inof Mere, all, so by the definition of clivisibility we can say there is an integer P such mot b=9p. So for any integer C Lee can anife be = 3 pe pris means a divide be, since pe is an integer too. (1) if 31b and ble, then 31c. Here, 916 any 61C. So by the definition of Instituty
we can say have integers part 9 such that 5=3p gnd (= 59 1: e (= 3pg. Since, pg is gristages eve Conclude that Tinson Algerithm there is a quotient and a tremainder, as
the drinon algorithm shows: Algerithm: - Let 2 be on integer and of a positive integer. Then there are unique integers 9 and 2, with 0 \( \) x < d, such that 2 = dq + r. Here, a is called dividend, dis called divising 9 is called gustient, and ris called remainder. There, notation is used to express the guspient and remainder: 9= adivd, r= a mod el.

Eagnile, what are the gyothert and remainder cohen 101 in divident by 11? Sorry nee house (quitient)

(dividend) 101 = (divisor) (quitient)

(dividend) 101 = 11.9.12 (remainded) Mence, the quotient when 100 is chided by 11
is 9 = 101 dir 11, and the remainder is 2 = 101 mod 11: Example: 9=19, d=3 J 19 = 3×9+2 Mence, the questiont when 19 is divided bys is 9 = 29 div 3 and the remainder is 2=19mod3. Comple what are the quotient and remainder when -11 in divided by 3! 8M7 we have, -11= 03(-4)+1 Here the gustient when - 11 in divided to 3 is - 9 = -11 div 3, and the remainder is -1 = -11 mod 3. Me, that the remainder count be -ve. Consequely
the remainder in rop -2, over though - 11= 3(-3)-21 because, r=-2 clocard sappy 0 Ex 23.