## Number Theory 1

06 August 2023 11:05

x 17 meous or divides of 1/2 and 21/0 are always true xly and 7/2 > x/2  $x|y \Rightarrow y = kx$  when  $k \in \frac{2}{7} - \{0\}$ J € 7 € 2 - {o} 2 0 > 2.0 0

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x/y and  $x,y \in \mathbb{Z}$  then either y = 0 on  $|x| \le |y|$ 4=kx 181=1K1x1 = 181> (x)

aly and n, y Ezt ten a 5 y >1x1=x,1x1=7 y=kx H121213722

S = 3 muliples of 5 } = {--- 10, -5, 0, 5, 10, 15, --- } S,, S2 €S ke-t. Se≤  $S_1 + S_2 \in S$ 

autiple to ES

 $S \in S$   $S_1 + S_2 \in S$   $[k_1 S_1 + k_2 S_2 \in S] \quad \text{far ell } [k_1, k_2 \in S] \quad \text{and} \quad S_1, S_2 \in S[$ 

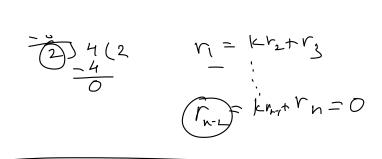
Propohes: - 1/x, x/O x/x 214 and y12 > 124=14) > x=+4 2/2 = 5/4 mo f/x aly, 2 means xly and x/z 217,2 > 2/ay+b2 4 a, be-# xly > xly 2 aly if ond only if x2/y2 where 2+0

8. 
$$n|2n+1 \Rightarrow n|1 \Rightarrow n=\pm 1$$
  
82. For two integers  $x, y$  than  $(x-y)|(x^n-y^n)$  facong  $n \in \mathbb{Z}$   
 $x^n-y^n = (x-y)(x^{n-1}+x^{n-2}y+\dots+xy^{n-2}+y^{n-1})$   
 $= x^n+x^{n-1}y+\dots+xy^{n-2}+y^{n-1}$   
 $= x^n-y^n$   
 $= x^n-y^n$ 

b= Katr; O<r<a to find lu ged of a ond b

Suppose d/(k1) > 3/ Kr-K/6/+ /4/6/ > d/42 > d=1 qcd (a/p) = g gk, = a k, k, ar coprime ada, b-ka) = g(d(gk1,gk1-kgk1) = 9 [ qcd ( F1, K2-K(4) ) = 9+

(24, 10)b=ka+V1 10)24( \ -10 10(2 a= kr,+r, ~ = kr2+r3



Some numbers exist which has no divisors  $\Rightarrow$  primes  $\forall k \in \mathcal{F}$ ,  $k \neq p$  ten p is prime except |k| = p, and |k| = 1

Q. Find all tre integers in far which 3n-4, 4n-5, 5n-3 are all primes.

Ans: -3n-4+4n-5+5n-3=12(n-1)  $\Rightarrow$  one of them must be even 2 is the only even prime  $n^{22}$ 

For N=1 we have 3n-4=-1 not passible for N=2 we have 3n-4=2, 4n-5=3, 5n-3=7for N=2 we have all of 3n-4, 4n-5, 5n-3>2For  $N\geq 3$  we have all of possible as one of them must be 2So all of  $N\geq 3$  not possible as one of them must be 2

a=Pi Pr. ... Pn > recessarily dustivet prime fetors one
P1. P2. / ... Pn

Total number of fetors

P, (r, +mas), P2(r2 tims)..., Pn (rn +mn)

P, (r, +rns), P2(r2 tims)..., Pn (rn +mn)

> r1+r2+... + rn number of fetors.

Fundomental Thearen of Arithrefic!

Any natural number greater than I has a unique foefairethon upto order.

 $N \in \mathbb{N}$ ,  $N = P_1^{V_1} P_2^{V_2} - P_n \longrightarrow P_1, P_2, \dots P_n$  one all district primes

NEN, N= PN PN--Pn >P, P, -Pn are all district primes

(>) the form is unique

(2 2) -> recessely district prime factors 2

(a) the prime factors 2

(b) the form is unique.

B. If a < b one two consentive prime numbers show that at b has at least 3 prime factors not necessarily distinct.

Am'. - b = a+2a+b=2a+2=2(a+1) shee 3,