

✓ (3.3) The Goldbach Conjecture

Conjecture: A conjecture is mathematical statement believed to be true based on observations. Conjecture arises when one notices a pattern that holds true for many cases.

Remark Since, a pattern holds true for many cases, it does not mean that the pattern will be hold true for all cases.

② Conjecture means a statement might be true (based on some research) but not proven.

② The Goldbach Conjecture : Every even integer greater than 2 can be expressed as the sum of two primes.

Another form of Statement of Goldbach's conjecture : All even integers greater than 4 are ~~expressed~~ written as sum of two odd prime numbers.

(example)

$$6 = 3 + 3$$

$$8 = 3 + 5$$

$$10 = 3 + 7$$

$$12 = 5 + 7$$

\vdots ; so on.

Exercise: 0-6, 10

(ex-6) Prove that Goldbach conjecture that every even integer greater than 2 is sum of two primes is equivalent to the statement that every integer greater than 5 is sum of three primes.

(proof) let every even integer greater than 2 is sum of two prime integers.

let $n > 5$; $n \in \mathbb{Z}$

if n is even integer then $n-2$ is even integer greater than 3, As given assumption $n-2 > 3$ is sum of two primes p & q .

$\therefore n$ is sum of three prime numbers 2, p & q .

if n is odd integer, then we have $n-3$ is even integer greater than 2.

As given assumption, $n-3$ is sum of same two prime numbers p' & q' .

$\therefore n$ is sum of three primes 3, p' & q' .

conversely,

let every integer greater than 5 is

sum of three prime integers.

(do as on same lines)