

Title Twin Prime Conjecture

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Abstract The Twin Prime Conjecture states there are infinitely many pairs of primes that differ by 2.

Examples of twin primes are:

11, 13  
71, 73  
5021, 5023

Method This attempt uses Bertrand's postulate.

Bertrand's Postulate, for which there are several proofs, states that for any number  $n > 1$  there is always a prime between  $n$  and  $2n$ .

Thus for a prime  $P$  the next prime is in the following set of odd numbers:

$$\{P+2, P+4, \dots, P+P-1\}$$

In other words the difference between  $P$  and the next prime is in:

$$\{2, 4, \dots, P-1\} \quad (S)$$

Clearly as  $P$  increases so does the size of  $(S)$  but the possibility of a difference of 2, 4, ... remains.

Hence the probability of a difference of 2 between  $P$  and the next prime is  $>0$  and since the number of primes is infinite so is the number of twins.

Bertrand's Postulate, which has been proved, states that for any number  $n > 1$  there is always a prime between  $n$  and  $2n$ .

Thus for a prime  $P$  then next prime is one of the following set:

$$\{P+2, P+4, \dots, P+P-1\}$$

In other words the difference between  $P$  and the next prime can be:

$$\{2, 4, \dots, P-1\}$$