Consecutive Prime Sum.

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- Some prime numbers can be expressed as a sum of other consecutive prime numbers. For example 5 = 2 + 3, 17 = 2 + 3 + 5 + 7, 41 = 2 + 3 + 5 + 7 + 11 + 13. Your task is to find out how many prime numbers which satisfy this property are present in the range 3 to N subject to a constraint that summation should always start with number 2.
- Write code to find out the number of prime numbers that satisfy the above-mentioned property in a given range.
- Input Format: First line contains a number N
- Output Format: Print the total number of all such prime numbers which are less than or equal to N.
- Constraints: 2<N<=12,000,000,000

In [93]:

```
N = int(input('Enter the upper bound: '))
```

```
Enter the upper bound: 20
```

In [109]:

```
def get_numbers_below(n):
    if n%2 == 0:
        n += 1
    numbers = list(range(3,n+1,2))
    return numbers[:numbers.index(n)]
```

In [79]:

```
def isprime(n):
    for ii in get_numbers_below(n):
        if n%ii == 0:
            return False
            break
    return True
```

In [80]:

```
def generate_primes_under(N):
    primes = [2]
    for ii in range(3,N+1,2):
        if isprime(ii):
            primes.append(ii)
    return primes
```

Main Calculation:

In [90]:

```
def check_sum_of_primes(N):
    m = generate_primes_under(N)

    answer = []
    for jj in range(2, len(m)):
        if sum(m[:jj]) in m:
            answer.append((m[:jj], sum(m[:jj])))

    return answer
```

Outputs:

In [96]:

```
print('For N = 20, \n')
print('The number of items is: ', len(check_sum_of_primes(20)))
print('The items are: ', check_sum_of_primes(20))
```

```
For N = 20,

The number of items is:  2
The items are:  [([2, 3], 5), ([2, 3, 5, 7], 17)]
```

In [111]:

```
print('For N = 200, \n')
print('The number of items is: ', len(check_sum_of_primes(200)))
print('The items are: ', check_sum_of_primes(200))
```

```
For N = 200,

The number of items is:  4
The items are:  [([2, 3], 5), ([2, 3, 5, 7], 17), ([2, 3, 5, 7, 11, 13], 41),
([2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37], 197)]
```

In [112]:

```
print('For N = 151, \n')
print('The number of items is: ', len(check_sum_of_primes(151)))
print('The items are: ', check_sum_of_primes(151))
```

```
For N = 151,

The number of items is:  3
The items are:  [([2, 3], 5), ([2, 3, 5, 7], 17), ([2, 3, 5, 7, 11, 13], 41)]
```

The End.