> # "

> # Goldbach's Weak Conjecture is equivalent to all odd numbers greater than 9 are the sum of 3 odd prime numbers.

> # This 3 primes problem was proven in 2013 by Helfgott.

> # We will shine a light on his efforts.

> # His proof is over 50 pages and involves mathematical 'major arcs'.

> # Here we consider only the sum of two prime numbers. This is called the 'strong Goldbach conjecture'.

> restart

> # Goldbach Partition written gp

> gp := **proc** ($n :: integer$) $:: integer$;
>   **description** "Return the number of ways that n can be written as the sum of two primes.";
>   **local** $a, b, c, d, temp, counter$;
> $counter := 0$;
>
>   **for** b **from** 2 **to** $\frac{n}{2}$ **do**
>
>   **for** c **from** 2 **to** $\frac{n}{2}$ **do**
>
> $temp := ithprime(b) + ithprime(c)$;
>   **if** $n = temp$ **then** $counter := counter + 1$; **end if**;
>   **end do**;
>   **end do**;
>   **return** $counter$;
>   **end proc**;

$gp := $ **proc**($n{::}integer$)$::integer$;   **(1)**
   local $a, b, c, d, temp, counter$;
   description "Return the number of ways that n can be written as the sum of two primes.";
   $counter := 0$;
   for b **from** 2 **to** $1/2*n$ **do**
       for c **from** 2 **to** $1/2*n$ **do**
           $temp := ithprime(b) + ithprime(c)$; **if** $n = temp$ **then** $counter := counter + 1$ **end if**
       end do
   end do;
   return $counter$
end proc

> $gp(2)$

                                    0   **(2)**

                                                                         (3)

> **for** e **from** 2 **to** 20 **by** 2 **do**
> $print(e, gp(e))$
>   **end do**

                              2, 0
                              4, 0
                              6, 1
                              8, 2

$$10, 3$$
$$12, 2$$
$$14, 3$$
$$16, 4$$
$$18, 4$$
$$20, 4$$

(4)

> # for example 6 is only 3 + 3, given only odd prime numbers. Also, 8 is 5+3 and 3+5, so gp (8) is 2. Similarly, 10 is 5+5, 3+7 and 7 + 3. and gp(10) is 3.

> # Thus we have built a data table.

> # Next to share this.

>

> # see the Online Encyclopedia of Integer Sequences (oeis.org) serial number A002372.

> # oeis.org slash A002372 begins 0,0,1,2,3,2,3,4.

> # Matt C. Anderson

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