

Amicable numbers

Problem 21 (<http://projecteuler.net/problem=21>)

Let $d(n)$ be defined as the sum of proper divisors of n (numbers less than n which divide evenly into n). If $d(a) = b$ and $d(b) = a$, where $a \neq b$, then a and b are an amicable pair and each of a and b are called amicable numbers.

For example, the proper divisors of 220 are 1, 2, 4, 5, 10, 11, 20, 22, 44, 55 and 110; therefore $d(220) = 284$. The proper divisors of 284 are 1, 2, 4, 71 and 142; so $d(284) = 220$.

Evaluate the sum of all the amicable numbers under 10000.

Solution

```
In [1]: ▶ def dn(n):  
        x, h, s = 1, n//2, 0  
        while x<=h:  
            if n % x == 0:  
                s += x  
            x += 1  
        return s  
  
        print(sum(x for x in range(10000) if x == dn(dn(x)) and x  
31626
```