Problem 36

The decimal number, $585 = 1\,001\,001\,001_2$ (binary), is palindromic in both bases.

Find the sum of all numbers, less than one million, which are palindromic in base 10 and base 2.

(Please note that the palindromic number, in either base, may not include leading zeros.)

Solution

The number cannot be a multiple of 2, and hence must be odd.

In[1]:= `palindromicQ[n_, b_] := IntegerDigits[n, b] == Reverse[IntegerDigits[n, b]]`

In[2]:= `Select[Range[1, 1 000 000, 2], palindromicQ[#, 10] && palindromicQ[#, 2] &]`

Out[2]= {1, 3, 5, 7, 9, 33, 99, 313, 585, 717, 7447,
 9009, 15 351, 32 223, 39 993, 53 235, 53 835, 73 737, 585 585}

In[3]:= `Total[%]`

Out[3]= 872 187