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 As per Euclid-Euler theorem 2*p*−1(2*p* − 1) is a perfect number whenever 2*p* − 1 is Mersenne prime and p>=2

2*p*−1(2*p* − 1) = 2*2p*−1− 2*p-1*

So given a closed range [x,y] if the range contains perfect numbers then we can find integers that satisfy the following condition

2*2a* ≤ x < 2*2p*−1− 2*p-1* < y ≤ 2*2b*

The above condition is true for a < p < b where a,b are integers  
  
So for all Mersenne primes between **a** and **b** we can calculate perfect numbers using the above Euclid’s formula, which will fall between the range x and y.