Project Euler

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## Problem 1: Multiples of 3 and 5

%% Problem 1

%If we list all the natural numbers below 10 that are multiples of 3 or 5,

%we get 3, 5, 6 and 9. The sum of these multiples is 23.

%Find the sum of all the multiples of 3 or 5 below 1000.

%We create a vector with all the natural numbers from 1 to 9.

n=1000;

v=1:(n-1);

%We use a for loop and an if-else statement to find the multiples of 3 and

%5.

a=zeros(size(v));

for ii=1:length(v)

if rem(ii,3)==0

a(ii)=v(ii);

elseif rem(ii,5)==0

a(ii)=v(ii);

end

end

a=a(a~=0);

fprintf('The sum of all the multiples of 3 or 5 is below %.f is %.f.\n',n,sum(a));

clear

## Problem 2: Even Fibonacci numbers

%Each new term in the Fibonacci sequence is generated by adding the previous two terms.

%By starting with 1 and 2, the first 10 terms will be:

%1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

%By considering the terms in the Fibonacci sequence whose values do not

%exceed four million, find the sum of the even-valued terms.

%The two first terms are 1 and 2.

v=[1 2 0];

ii=3;

%We use the equation: F(n)=F(n-2)+F(n-1).

while (v(ii-2)+v(ii-1))<4000000

v(ii)=v(ii-2)+v(ii-1);

ii=ii+1;

end

%Then we find the sum of the even-valued terms.

%An even number is when a number divided by 2 has no remainder.

%For example 2/2=1 and 8/2=4.

even\_v=zeros(size(v));

clear ii

%We use the remainder function to make a vector with the even terms.

for ii=1:length(v)

if rem(v(ii),2)==0

even\_v(ii)=v(ii);

else

end

end

%We then use the disp function to print the sum of the even terms.

disp(sum(even\_v))

## Problem 3: Largest prime factor

%The prime factors of 13195 are 5, 7, 13 and 29.

%What is the largest prime factor of the number 600851475143 ?

clear

tic

number=600851475143;

%First we find the factors of the number.

factors=0;

prime\_factors=0;

ii=0;

w=0;

%if product of the prime factors is less than the number is continues.

while prod(prime\_factors)<number

ii=ii+1;

if rem(number,ii)==0

factors(ii)=ii;

else

factors(ii)=0;

end

w=find((rem(factors(ii),1:factors(ii)))==0);

if length(w)==2

prime\_factors(ii)=factors(ii);

end

prime\_factors=prime\_factors(prime\_factors~=0);

end

clear w ii

disp('The prime factors are:')

disp(prime\_factors)

toc

## Problem 4: Largest palindrome product

Problem 5: Smallest multiple

Problem 6: Sum square difference

Problem 7: 10001st prime

Problem 8: Largest product in a series

Problem 9: Special Pythagorean triplet

Problem 10: Summation of primes

Problem 11: Largest product in a grid

Problem 12: Highly divisible triangular number

Problem 13: Large sum

Problem 14: Longest Collatz sequence

Problem 15: Lattice paths

Problem 16: Power digit sum

Problem 17: Number letter counts

Problem 18: Maximum path sum I

Problem 19: Counting Sundays

Problem 20: Factorial Digit Sum

Problem 21: Amicable Numbers

Problem 22: Names scores

Problem 23: Non-abundant sums

Problem 24: Lexicographic permutations