

Простые числа Prime Numbers

Простое число делится только на 1 или на само себя

Сборники программ на разных языках программирования

https://rosettacode.org/wiki/Category:Prime_Numbers

https://rosettacode.org/wiki/10001th_prime

https://rosettacode.org/wiki/Extensible_prime_generator

QB64: число простое или есть множители

```
Dim p As Long: f=0: j=2: q=0: t=Timer: ' p = 2^31-1:
Randomize Timer: p = int(rnd*2^25): s=p^0.5
While f < 1 ' PRIME_mult.bas russian DANILIN
  If j >= s Then f=2
  If p Mod j = 0 Then q=1: Print p, j, Int(p/j)
  j = j + 1
Wend
If q <> 1 Then Print p, " Prime", p/10^9, " Billions"
Print p, Timer - t
```

QB64: найти 10001-е простое число классическая задача

```
max=10001: n=1: p=0: t = Timer ' PRIME_num.bas DANILIN
While n <= max ' 10001 104743 0.35 seconds
  f=0: j=2: s=p^0.5
  While f < 1
    If j >= s Then f=2
    If p Mod j = 0 Then f=1
    j=j+1
  Wend
  If f <> 1 Then n=n+1: ' Print n, p
  p=p+1
Wend
Print n-1, p-1, Timer-t
```

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A formula for primes?

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, ...

$$n\text{th prime} = 1 + \sum_{i=1}^{2^n} \left[\left(\frac{n}{\sum_{j=1}^i \left[\left(\cos \pi \frac{(j-1)!+1}{j} \right)^2 \right] \right)} \right]^{1/n}$$

C. P. Willans,
1964

C#: число простое или есть множители

```
using System; using System.Text; // PRIME_mult.cs DANILIN
namespace prime // rextester.com/VBXFL2777
{ class Program
  { static void Main(string[] args)
    { var start = DateTime.Now; int f=0; int j=2; int q=0;
      Random rand = new Random(); // long p = 2147483648-1;
      long p = rand.Next(Convert.ToInt32(Math.Pow(2, 22))-1);
      long s = Convert.ToInt32(Math.Pow(p,0.5));
      while (f < 1)
        { if (j >= s)
          { f=2; }
          if (p % j == 0)
            { q=1; Console.WriteLine("{0} {1}
{2}",p,j,Convert.ToInt32(p/j));}
          j++;
        }
      if (q != 1) { Console.WriteLine("Prime {0} BillionS", p); }
      var finish = DateTime.Now;
      Console.WriteLine(finish - start);
      Console.ReadKey();
    }}}
```

C#: найти 10001-е простое число

```
using System; using System.Text; // PRIME_num.cs DANILIN
namespace p10001 // 1 second 10001 104743
{ class Program // rextester.com/ZBEPGE34760
  { static void Main(string[] args)
    { int max=10001; int n=1; int p=1; int f; int j; long s;
      while (n <= max)
        { f=0; j=2; s=Convert.ToInt32(Math.Pow(p,0.5));
          while (f < 1)
            { if (j >= s)
              { f=2; }
              if (p % j == 0) { f=1; }
              j++;
            }
          if (f != 1) { n++; } // Console.WriteLine("{0} {1}",
n, p);
          p++;
        }
      Console.Write("{0} {1}", n-1, p-1);
      Console.ReadKey();
    }}}
```

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с++ число простое или есть множители

```
#include <iostream> // PRIME_mult.cpp DANILIN
#include <cmath> // rextester.com/YDXE69472
using namespace std; int main()
{ setlocale (LC_ALL, "RUS"); srand(time(NULL));
  int i; int f=0,j=2,q=0; double p,s; p=0; // long p = 2147483648-1;
  for (i=0;i<9;i++) p=p+pow(10., i)*(rand()%10);
  s = int (pow(p, 0.5));
  cout << int(p) <<" " << s << endl;
while (f < 1)
{ if (j >= s) { f=2; }
  if (int (p) % int (j) == 0)
  { q=1; cout << int(p) <<" " <<j<<" " << int(p/j) <<endl;}
  j++;
}
if (q != 1) { cout <<"Prime " << p << endl; }
system("pause");
}
```

с++ найти 10001-е простое число

```
#include <iostream> // PRIME_10k.cpp DANILIN
#include <cmath> // rextester.com/ZUNIGB54689
using namespace std; int main() // 104743
{ setlocale (LC_ALL, "RUS"); srand(time(NULL));
  int max=10004, n=1, p=1; int f, j; double s;
while (n <= max)
{ f=0; j=2; s = int (pow(p, 0.5));
  while (f < 1)
  { if (j >= s) f=2;
    if (int(p) % int(j) == 0) f=1;
    j++;
  }
  if (f != 1) { n++; } // cout << n <<" " << p << endl;
  p++;
}
cout << n-1 <<" " << p-1 << endl;
system("pause");
}
```

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JavaScript JS число простое или есть множители

```
<!DOCTYPE html> <html lang="en"> <head> <meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<meta http-equiv="X-UA-Compatible" content="ie=edge">
<title>PRIME js JavaScript</title>
<html> <body> <noscript>Vkluch JS</noscript>
```

<https://jdoodle.com/h/2UZ>

```
<script>

var f = 0, j=2, q=0 // p = 2147483648-1;
var p = parseInt(Math.random()*Math.pow(2,22)) -1 // 1234566674;
var s = parseInt(Math.pow(p, 0.5))

document.write( "<br>"+ p + " " + s + "<br>" )

while (f < 1)
{ if (j >= s) { f=2 }
  if ( p % j == 0 )
    { q=1; document.write(p+" _ "+j+" _ "+ p/j + "<br>" ) }
  j++
}

if (q != 1) { document.write("Prime "+ p + "<br>" ) }

</script>

</body> </html>
```

Python: найти 10001-е простое число

```
import time; max=10001; n=1; p=1; # PRIME_num.py DANILIN
while n<=max: # 78081 994271 45 seconds
    f=0; j=2; s = int(p**0.5) # rextester.com/AAOHQ6342
    while f < 1:
        if j >= s:
            f=2
        if p % j == 0:
            f=1
        j+=1
    if f != 1:
        n+=1;
        #print(n,p);
    p+=1
print(n-1,p-1)
print(time.perf_counter())
```

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JavaScript JS найти 10001-е простое число

```
<!DOCTYPE html> <html lang="en"> <head> <meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<meta http-equiv="X-UA-Compatible" content="ie=edge">
<title>PRIME 10k js JavaScript</title>
<html> <body> <noscript>Vkluch JS</noscript>
```

<https://jdoodle.com/h/2V1>

```
<script>
```

```
var max = 10001, n=1, p=1; var f,j,s
while (n <= max)
{ f=0; j=2; s = parseInt(Math.pow(p, 0.5))
  while (f < 1)
    { if (j >= s) f=2
      if ( p % j == 0 ) f=1
      j++
    }
  if (f != 1) n++ // { document.write(n + " " + p + "<br>") }
  p++
}
document.write("<br>" + (n-1) + " " + (p-1) + "<br>")
```

```
</script>
```

```
</body> </html>
```

=====

Python: число простое или есть множители

```
import time; from random import randint # PRIME_mult.py DANILIN
p = randint(1, 2**25); s=int(p**0.5); f=0; j=2; q=0; # p=2**31-1;
while f < 2: # rextester.com/QFZD94890
  if j >= s: # 2**31-1 = 2_147_483_647
    f=2 # max 2_308_621_829
  if p % j == 0:
    q=1
    print (p,j,int(p/j))
  j+=1
if q != 1:
  print(p," Prime", p/10**9, " BillionS")
print(time.perf_counter(), " seconds")
```
