

January 13, 2014

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1 Lecture 3 (Jan 10, 2014)

- Distribution of primes
- Sage and SageMathCloud

NOTE: Andrew Ohana will teach the class on Wed, Jan 15 and Fri, Jan 17.

1.1 Syllabus

- hand out print copies
- go over in detail

2 Prime numbers

2, 3, 5, 7, 11, etc.

An integer $n > 1$ is prime if it is divisible only by itself.

Theorem: There are infinitely many primes.

Give proof on the board.

3 Largest KNOWN Prime

As of October 2013, the largest known prime number is $2^{57,885,161}-1$, a number with 17,425,170 digits. see http://en.wikipedia.org/wiki/Largest_known_prime_number

This is a Mersenne prime. It is the 48th Mersenne prime, i.e., of the form $2^p - 1$.

```
%time p = 2^57885161 - 1  
CPU time: 0.01 s, Wall time: 0.01 s
```

```
%time s = str(p)  
CPU time: 14.56 s, Wall time: 14.55 s
```

```
len(s)  
17425170
```

```
s[:10] + '...' + s[-10:]  
'5818872662...1724285951'
```

Prizes still

150,000 thousand dollars to the first individual or group who discovers a prime number with at least 100,000,000 decimal digits

<https://www.eff.org/awards/coop>