

Week ∞

A Sample T_EX SIGma Presentation

Ma, Sig



Outline

Basics

RSA

Some Intuition

The Math

Conclusion



Updates!

Weekly updates:

- SIGma is an excellent SIG.
- I'm out of ideas for updates.



Section 1

Basics



There Is No Largest Prime Number

The proof uses *reductio ad absurdum*.

Theorem

There is no largest prime number.

1. Suppose p were the largest prime number.



There Is No Largest Prime Number

The proof uses *reductio ad absurdum*.

Theorem

There is no largest prime number.

1. Suppose p were the largest prime number.
2. Let q be the product of the first p primes.



There Is No Largest Prime Number

The proof uses *reductio ad absurdum*.

Theorem

There is no largest prime number.

1. Suppose p were the largest prime number.
2. Let q be the product of the first p primes.
3. Then $q + 1$ is not divisible by any of them.



There Is No Largest Prime Number

The proof uses *reductio ad absurdum*.

Theorem

There is no largest prime number.

1. Suppose p were the largest prime number.
2. Let q be the product of the first p primes.
3. Then $q + 1$ is not divisible by any of them.
4. But $q + 1$ is greater than 1, thus divisible by some prime number not in the first p numbers.



There Is No Largest Prime Number

The proof uses *reductio ad absurdum*.

Theorem

There is no largest prime number.

1. Suppose p were the largest prime number.
2. Let q be the product of the first p primes.
3. Then $q + 1$ is not divisible by any of them.
4. But $q + 1$ is greater than 1, thus divisible by some prime number not in the first p numbers.
5. There exists a prime larger than p .



Section 2

RSA

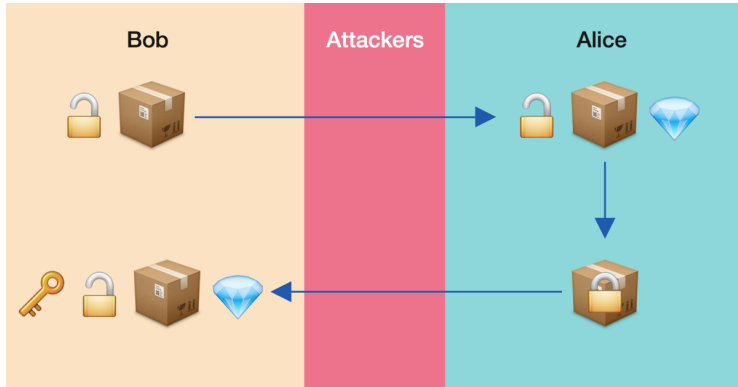


Subsection 1

Some Intuition



Image



Subsection 2

The Math



Key Generation

1. Find primes p, q . Compute $n = pq$.
2. Compute $\phi = (p - 1)(q - 1)$.
3. Let e be a number coprime to n .
4. Compute $d = e^{-1} \pmod{\phi}$.
5. (n, e) is the **public key** tuple, d is the **private key**.



Message Exchange

1. To send message m to Alice, Bob computes $c = m^e \pmod n$ using Alice's public key (n, e) and sends c to Alice.
2. Alice computes $m = c^d \pmod n$ to recover m .



Some Math Mode Testing

$$\frac{x^2 + 3}{y^2 + 7}$$

$$\mathcal{L}_{\mathcal{T}}(\vec{\lambda}) = \sum_{(\mathbf{x}, \mathbf{s}) \in \mathcal{T}} \log P(\mathbf{s} \mid \mathbf{x}) - \sum_{i=1}^m \frac{\lambda_i^2}{2\sigma^2}$$

$$\int_0^8 f(x) dx$$



Some Sample Code

```
1      x = 10
2      y = "mystring"
3      print("Hello world!")
```



Section 3

Conclusion



So long, and thanks for all the fish!

