Euclid of Alexandria euclid@alexandria.edu October 27, 2018

Outline

1. Motivation

1.1. The Basic Problem That We Studied

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1.1 The Basic Problem That We

Studied

What Are Prime Numbers? I

Definition: Prime number

A *prime number* is a number that has exactly two divisors.

What Are Prime Numbers? II

Example:

- 2 is prime (two divisors: 1 and 2).
- 3 is prime (two divisors: 1 and 3).
- 4 is not prime (three divisors: 1, 2, and 4).

Theorem: Prime numbers

There is no largest prime number.

Proof:

1. Suppose *p* were the largest prime number.

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- **2.** Let q be the product of the first p numbers.
- **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.

The proof used reductio ad absurdum.

What's Still To Do?

- Answered Questions
 - How many primes are there?
- Open Questions
 - Is every even number the sum of two primes?

An Algorithm For Finding Prime Numbers.

FindPrimeNumbers

```
int main (void)
std::vector<bool> is_prime (100, true);
for (int i = 2; i < 100; i++)
if (is_prime[i])
  std::cout << i << "_";
  for (int j = i; j < 100; is_prime [j] = false, j
     +=i);
  return 0;
```

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Note the use of std::.

It's me, Euclid

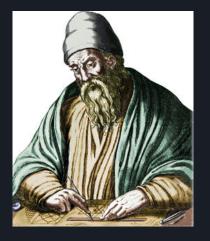


Figure: It's me, Euclid [1]

References I

- [1] URL: https: //upload.wikimedia.org/wikipedia/commons/3/30/Euklid-von-Alexandria_1.jpg (visited on 10/22/2018).
- [2] Noam Chomsky. Syntactic Structures. The Hague: Mouton, 1957.
- [3] William Labov. Sociolinguistic Patterns. Philadelphia: University of Pennsylvania Press, 1972.