

[TAOCP 5 8.9.10.11]

# A Sample T<sub>E</sub>X SIGma Presentation

Ma, Sig

# Outline

Basics

Some Template Slides

A subsection, Wow

Conclusion

# Updates!

Weekly updates:

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

# Section 1

## Basics

## Some Text

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- Use `\pause` for this
- colors are cool

## Some Math Mode Testing

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

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

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



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The proof uses *reductio ad absurdum*.

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4. But  $q + 1$  is greater than 1, thus divisible by some prime number not in the first  $p$  numbers.
5. Thus, there exists a prime larger than  $p$ .

# Sequential Math Frames

Here is a sentence

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$$\begin{aligned}\zeta(s) &= \sum_{n=1}^{\infty} \frac{1}{n^s} \\ &= \prod_{p \in \text{primes}} \frac{1}{1 - p^{-s}} \\ &= \frac{1}{1 - 2^{-s}} \cdot \frac{1}{1 - 3^{-s}} \cdots\end{aligned}$$

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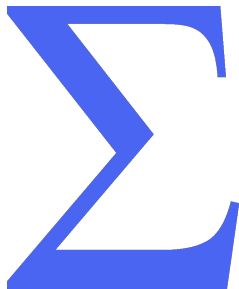
## Section 2

Some Template Slides

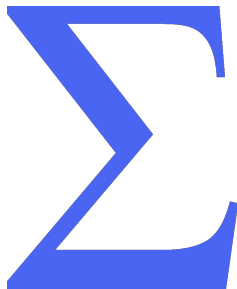
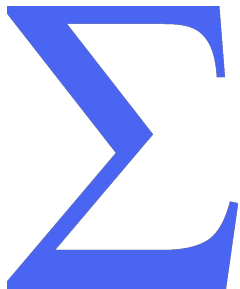
## Subsection 1

A subsection, Wow

Image



Side by Side



## Demonstration of algo and nalgo env

GETRANDOMNUMBER():

return 4    *⟨⟨ chosen by fair dice roll. ⟩⟩*  
              *⟨⟨ guaranteed to be random. ⟩⟩*

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Random number generation from [Mun07].    *⟨⟨ \cref for line numbers does not work. If you want to refer to specific line numbers, do it manually ⟩⟩*

**ALGORITHM P**( $S[a_0, \dots, a_n]$ ):

```
1:  $C[1..n] \leftarrow 0, O[1..n] \leftarrow 1$ 
2: while TRUE:
3:   PRINT( $S$ )
4:    $j \leftarrow n, s \leftarrow 0$ 
5:   A:  $q \leftarrow C[j] + O[j]$ 
6:       if  $q < 0$ : goto D
7:       if  $q = j$ : goto B
8:       SWAP( $S, j - C[j] + s, j - q + s$ )
9:        $C[j] \leftarrow q$ 
10:      continue
11:   B: if  $j = 1$ :
12:       break
13:        $s \leftarrow s + 1$ 
14:   D:  $O[j] \leftarrow -O[j], j \leftarrow j - 1$ 
15:       goto A
```

- Here is an example of annotating an algorithms



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- Here is an example of annotating an algorithms
- We have grayed out text to highlight what we want to discuss

## Source Code

```
1  def algorithm_g(n):
2      a = [0 for _ in range(n + 1)]
3      while True:
4          curr = a[1 : n + 1][::-1]
5          yield "".join([str(i) for i in curr])
6
7          a[0] = 1 - a[0]
8          j = 1
9          while a[j - 1] != 1:
10             j += 1
11             if j == n + 1:
12                 return
13             a[j] = 1 - a[j]
```

## Theorems and Lemmas

### Lemma

The map  $\mathbb{C} \times (\mathbb{C} \setminus \{0\}) \rightarrow \mathbb{C}$ ,  $(z, w) \mapsto z/w$  is  $C^\infty$ .

### Proof

To see this, we identify  $\mathbb{C}$  with  $\mathbb{R}^2$  where  $a + bi = (a, b)$ . Thus our map is now

$$\begin{aligned}(\mathbb{R}^2) \times (\mathbb{R}^2 \setminus \{(0, 0)\}) &\rightarrow \mathbb{R}^2 \\ ((a, b), (c, d)) &\mapsto \left( \frac{ac + bd}{c^2 + d^2}, \frac{bc - ad}{c^2 + d^2} \right)\end{aligned}$$

which is well defined since at least one of  $c$  or  $d$  is nonzero. It is simple to verify that this map is equivalent to the original one. Since this new map is  $C^\infty$  in each component, we have that it is  $C^\infty$  overall.

Section 3

Conclusion

Questions?

## Questions!

- How many zeros of  $\zeta(s) = \sum_{i=1}^{\infty} \frac{1}{n^s} = \prod_{p \text{ prime}} \frac{1}{1-p^{-s}}$  have real part equal to  $\frac{1}{2}$ ?
- Find a closed form to the following recurrence:

$$f(n) = \begin{cases} f\left(\frac{n}{2}\right) & n \text{ even} \\ f(3n+1) & \text{otherwise} \end{cases}$$

*So long and thanks for all the fish!*

— DOUGLAS ADAMS ([1979](#))

# Bibliography



Randall Munroe.

Rfc 1149.5 specifies 4 as the standard ieee-vetted random number.

<https://xkcd.com/221/>, 2007.

Accessed: 01-09-2023.