

L-functions from an analytic perspective

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AIM

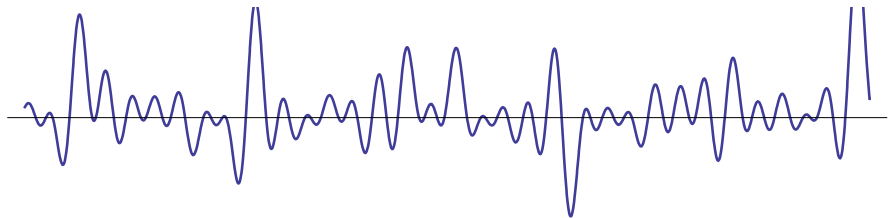
June 8, 2017

$Z(t)$ in two regions

$t \approx 5000$



$t \approx 100000$



A talk on giving a talk

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1. Hosting a talk
2. Playing golf
3. Playing poker
4. Writing LaTeX
5. Giving a colloquium or job talk

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(At least) 3 things

1. Most people invent their own method, or copy other people's bad habits
2. Most people do it poorly
3. Understanding a few basic principles can make you far above average

The math exposition spectrum

Formal: *definition – theorem – proof*

Research paper

Seminar talk

Textbook

Teaching

Job talk/Colloquium

Informal: *example – terminology – theorem – “proof”*

Proposition

Usually it is not helpful to state a formal definition in a colloquium talk.

Proof.

Consider each person in the audience.

Case 1. They already know the definition.

- seeing the definition will not be helpful to them

Case 2. They don't know the definition.

- probably not helpful without explanations and examples □

Instead: Give examples and explanation first. Then just note the terminology.

Proposition

It is never helpful to show a slide with your talk outline.

Proof.

Consider the types of talk outlines.

Case 1. Your outline is so general that it could apply to any talk.

- obviously a waste of time

Case 2. Your outline mentions key topics of your talk.

- You can leave the audience wondering about those topics,
- or you can waste even more time to prematurely explaining those topics.

Either way, the outline does not help people follow your talk.



Instead: Begin the storytelling.

“Say some words.” – Henryk Iwaniec

Some principles

Know your first sentence [after the 'Thank you']

Storytelling

- set the scene, introduce the characters, character development, plot, foreshadowing, connections, excitement
- work toward a goal

Transitions

- between parts of the talk, transition with a summary and a lead-in

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Conjecture

If $2 < X < \log^A T$, then

$$\max_{t \in [0, T]} |Z_X(\tfrac{1}{2} + it)| = O\left(\exp\left(\left(\tfrac{1}{\sqrt{2}} + \varepsilon\right)\sqrt{\log T \log \log T}\right)\right)$$

for all $\varepsilon > 0$ and no $\varepsilon < 0$.

2kth moment of the Riemann zeta function

$$M_{2k}(T) := \frac{1}{T} \int_1^T \left| \zeta\left(\frac{1}{2} + it\right) \right|^{2k} dt$$

Conjecture (Conrey and Ghosh)

There exists integers g_k such that

$$M_{2k}(T) \sim g_k a_k \log^{k^2} T,$$

where

$$a(k) = \prod_{\substack{p \\ \text{prime}}} \left(1 - \frac{1}{p}\right)^{k^2} \sum_{m=0}^{\infty} \left(\frac{\Gamma(m+k)}{m! \Gamma(k)} \right)^2 p^{-m}.$$

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The “reveal” should be used rarely:

- for dramatic effect, or
- you really really need to stop people from reading the next line.

If you routinely use several pauses per slide, then you probably are not aware of how those pauses disturb the flow of your talk.