Here is a captivating yet pithy description of our project

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Abstract

This document is a template for the real papers you will write for 18.821.

1 Introduction

{sec:intro}

This paper offers a tour of the exciting geometry of local rings, leading to our mastery of the pronunciation of the name of the journal in which [1] is published. The main tool we use is [2, Chapter 1]: we write down a simple differential equation {LocalRings} {ODE}

$$\frac{dU}{dt} = -U(t), \qquad U(0) = .01 \tag{1.1}$$ {eq:downhill}

describing the evolution of our understanding U of local rings. The meaning of this equation will become clearer in Section 2 below. For the moment, notice only that the variable t takes values in $\mathbb{R}$, the real numbers.

An unexpected benefit of our investigations was our discovery of the open source software [4]. One of the scripts included in the software distribution is `sudoku.ax`, which will solve sudokus for you instantly. (Typesetting here used the package `verbatim` which is loaded at the top of this file. Great for email and web addresses, computer code, and quotations from Hemingway.[1] [2] {atlas}

[1] `In order to write about life first you must live it.`

[2] Fortunately this is less true of mathematics.

2 The role of local rings in mathematics

{sec:setup}

In the body of the paper, you will begin to fulfill the promises you made in Section 1. Because this is only a template, and because of certain gender deficiencies, the author has chosen to hear what he wants to hear and disregard the rest. To put it another way, you will not learn here (does the repetition of the sound *hear* have a Hemingwayesque character?) what a local ring is. We will not even solve (1.1) for you.

As small compensation, here is an aligned equation for you:

$$\begin{aligned} \mathbb{Z}/2\mathbb{Z} &= \{0,1\} \\ \mathbb{Z}/3\mathbb{Z} &= \{0,1,2\} \\ \mathbb{Z}/5\mathbb{Z} &= \{0,1,2,3,4\}. \end{aligned} \tag{2.1}$$

{eq:alignedExample

If I just put these in one after the other, I'd get something quite different from (2.1):

$$\mathbb{Z}/2\mathbb{Z} = \{0,1\} \tag{2.2}$$

$$\mathbb{Z}/3\mathbb{Z} = \{0,1,2\} \tag{2.3}$$

$$\mathbb{Z}/5\mathbb{Z} = \{0,1,2,3,4\}. \tag{2.4}$$

You might sometimes prefer

$$Z/p\mathbb{Z} = \begin{cases} \{0,1\} & (\text{if } p=2) \\ \{0,1,2\} & (\text{if } p=3) \\ \{0,1,2,3,4\} & (\text{if } p=4) \\ \quad\vdots & \quad\vdots \end{cases} \tag{2.5}$$

{eq:casesExample}

Amazingly enough, Section 2 now provides three examples of local rings!

References

[1] M. Artin, *Algebraic approximation of structures over complete local rings*, Inst. Hautes Études Sci. Publ. Math. **36** (1969), 23–58.

[2] Earl A. Coddington and Norman Levinson, *Theory of ordinary differential equations*, McGraw-Hill Book Company, Inc., New York-Toronto-London, 1955.

[3] Luis Casian and Yuji Kodama, *On the cohomology of real Grassmann manifolds*, available at `arxiv:1309.5520`.

[4] *Atlas of Lie Groups and Representations software*, 2016. `https://github.com/jeffreyadams/atlasofliegroups`.