

# Stochastic Processes and Branching Brownian Motion

by

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B.A., Rice University, 2019

THESIS

Submitted in partial fulfillment of the requirements  
for the degree of Masters of Science in Mathematics  
in the Graduate College of the  
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Chicago, Illinois

Defense Committee:  
William Perkins, Chair and Advisor  
Cheng Ouyang  
Marcus Michelen

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TODO: A brief dedication to someone you care about. For example, “Dedicated to my cats, Neo and Trinity, who are purrfect in every way.”.

An example of “Dedication” can be found on page 15 of the thesis manual<sup>1</sup>.

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<sup>1</sup>[http://grad.uic.edu/sites/default/files/pdfs/ThesisManual\\_rev\\_06Oct2016.pdf](http://grad.uic.edu/sites/default/files/pdfs/ThesisManual_rev_06Oct2016.pdf)

## ACKNOWLEDGMENT

TODO: A page or two so of shout-outs to people you appreciate. Don't forget your advisor and committee members!

PES

## CONTRIBUTIONS OF AUTHORS

TODO: This section should give a rough overview of each chapter in the thesis, highlighting your contributions. Most importantly, for each one of your papers you are quoting, this section should briefly describe what each author's role / contribution was.

An example of "Contribution of Authors" section is on page 3 of the University's guide to iThenticate<sup>1</sup>.

*Here I'll cover the layout of each section and how it builds up to Branching Brownian Motion*

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<sup>1</sup>[http://grad.uic.edu/sites/default/files/pdfs/Introduction\\_to\\_Screening\\_Your\\_Thesis\\_or\\_Dissertation\\_using\\_iThenticate-final\\_a.pdf](http://grad.uic.edu/sites/default/files/pdfs/Introduction_to_Screening_Your_Thesis_or_Dissertation_using_iThenticate-final_a.pdf)

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## SUMMARY

TODO: *or should outline of chapters go here?* One to two page summary of the entire work.

Like a long abstract.

[

## CHAPTER 1

### INTRODUCTION

#### 1.1 Basics

TODO: Do I need much of an introduction? This can introduce the interesting points.

The Ramones are a great band from New York City (NYC). Probably even better than you remember. There have been books written about them, like “Hey Ho Let’s Go: The Story of the Ramones: The Story of The Ramones” (1) and “Jews, punk and the Holocaust: from the Velvet Underground to the Ramones—the Jewish-American story” (2).

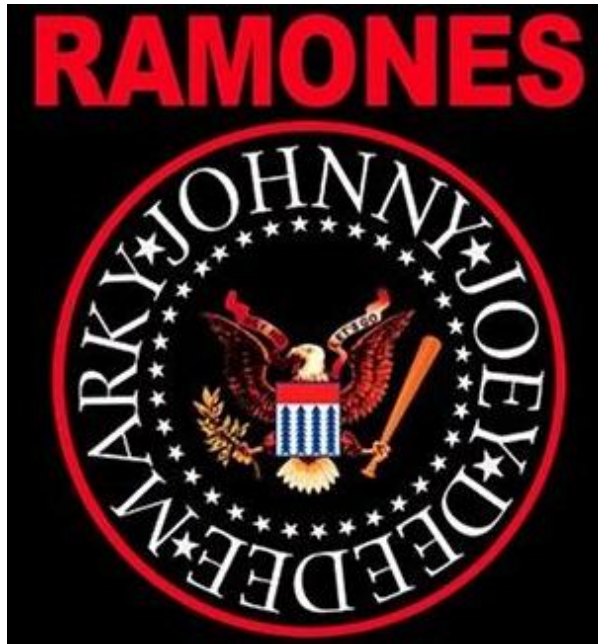


Figure 1: The Ramones band logo, the best dumb band ever.

Band Member	Instrument	Num Albums
Johnny Ramone	Guitar	14
Dee Dee Ramone	Bass	11
Joey Ramone	Vocals	14
Tommy Ramone	Drums	3
Marky Ramone	Drums	9
Richie Ramone	Drums	2
Elvis Ramone	Drums	0
C. J. Ramone	Drums	4

TABLE I: TABLE SHOWING HOW MANY RECORDS EACH MEMBER OF THE RAMONES WAS INVOLVED IN.

As Figure 5 shows, they had a great logo too. And they wrote amazing albums, like Rocket to Russia (RTR) and End of the Century (EOFC), and a couple more. They even did three (!) jingles for Steel Reserve<sup>1</sup>

## 1.2 Turmoil

However, things were always smiles-times for The Ramones. As Table V shows, there were lots of members in the band. Many of them were kind crummy, but hey, no one is perfect. Geepers, what a good band.

---

<sup>1</sup>The gross malt liquor.

## CHAPTER 2

### STOCHASTIC PROCESSES AND MARTINGALES

#### 2.1 Basics

TODO: Do I need much of an introduction? This can introduce the interesting points.

The Ramones are a great band from NYC. Probably even better than you remember. There have been books written about them, like “Hey Ho Let’s Go: The Story of the Ramones: The Story of The Ramones” (1) and “Jews, punk and the Holocaust: from the Velvet Underground to the Ramones—the Jewish-American story” (2).

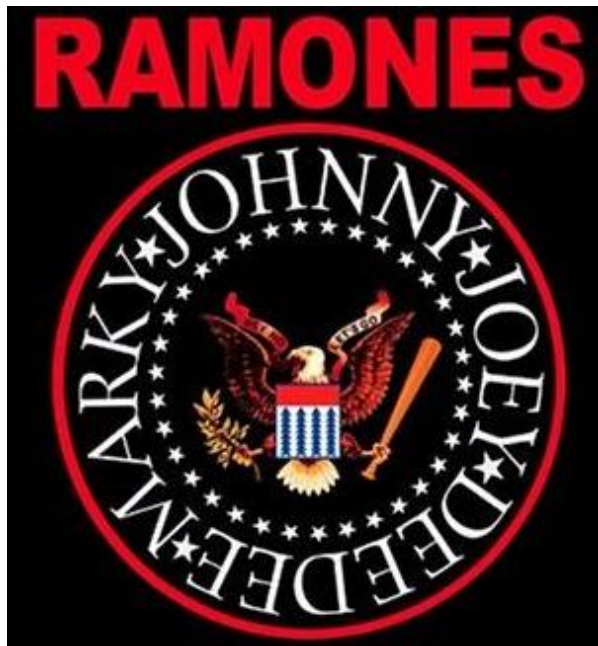


Figure 2: The Ramones band logo, the best dumb band ever.

Band Member	Instrument	Num Albums
Johnny Ramone	Guitar	14
Dee Dee Ramone	Bass	11
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## 2.2 Turmoil

However, things were always smiles-times for The Ramones. As Table V shows, there were lots of members in the band. Many of them were kind crummy, but hey, no one is perfect. Geepers, what a good band.

---

<sup>1</sup>The gross malt liquor.

## CHAPTER 3

### INTRODUCTION

#### 3.1 Basics

TODO: Do I need much of an introduction? This can introduce the interesting points.

The Ramones are a great band from NYC. Probably even better than you remember. There have been books written about them, like “Hey Ho Let’s Go: The Story of the Ramones: The Story of The Ramones” (1) and “Jews, punk and the Holocaust: from the Velvet Underground to the Ramones—the Jewish-American story” (2).

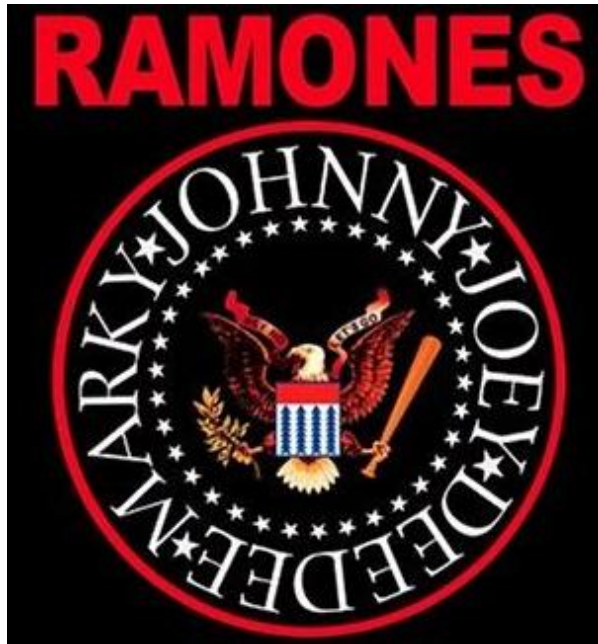


Figure 3: The Ramones band logo, the best dumb band ever.

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Joey Ramone	Vocals	14
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TABLE III: TABLE SHOWING HOW MANY RECORDS EACH MEMBER OF THE RAMONES WAS INVOLVED IN.

As Figure 5 shows, they had a great logo too. And they wrote amazing albums, like RTR and EOFC, and a couple more. They even did three (!) jingles for Steel Reserve<sup>1</sup>

### 3.2 Turmoil

However, things were always smiles-times for The Ramones. As Table V shows, there were lots of members in the band. Many of them were kind crummy, but hey, no one is perfect. Geepers, what a good band.

---

<sup>1</sup>The gross malt liquor.



## CHAPTER 4

### INTRODUCTION

#### 4.1 Basics

TODO: Do I need much of an introduction? This can introduce the interesting points.

The Ramones are a great band from NYC. Probably even better than you remember. There have been books written about them, like “Hey Ho Let’s Go: The Story of the Ramones: The Story of The Ramones” (1) and “Jews, punk and the Holocaust: from the Velvet Underground to the Ramones—the Jewish-American story” (2).

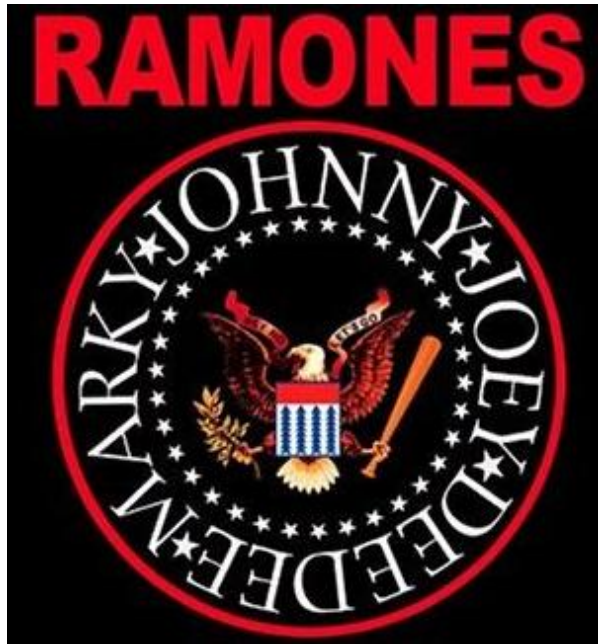


Figure 4: The Ramones band logo, the best dumb band ever.

Band Member	Instrument	Num Albums
Johnny Ramone	Guitar	14
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TABLE IV: TABLE SHOWING HOW MANY RECORDS EACH MEMBER OF THE RAMONES WAS INVOLVED IN.

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## 4.2 Turmoil

However, things were always smiles-times for The Ramones. As Table V shows, there were lots of members in the band. Many of them were kind crummy, but hey, no one is perfect. Geepers, what a good band.

---

<sup>1</sup>The gross malt liquor.

## CHAPTER 5

### INTRODUCTION

#### 5.1 Basics

TODO: Do I need much of an introduction? This can introduce the interesting points.

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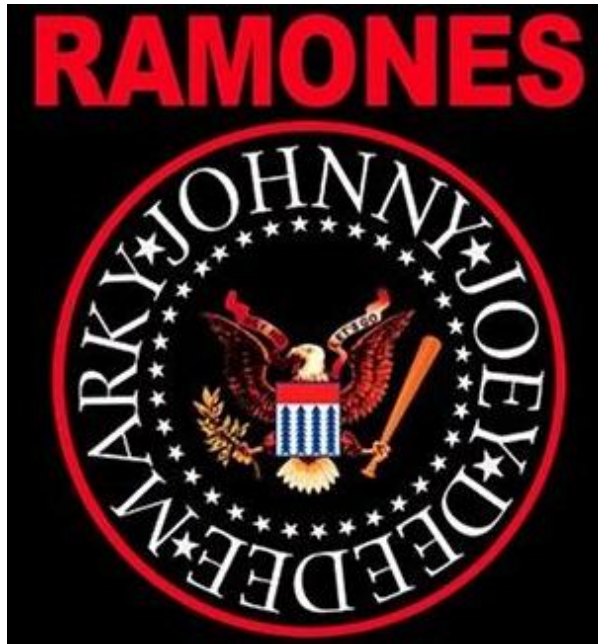


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## 5.2 Turmoil

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---

<sup>1</sup>The gross malt liquor.

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1. True, E.: Hey Ho Let's Go: The Story of the Ramones: The Story of The Ramones. Omnibus Press, 2010.
2. Stratton, J.: Jews, punk and the holocaust: from the velvet underground to the ramones—the jewish-american story. Popular music, 24(1):79–105, 2005.

## VITA

<b>NAME</b>	Sheena The Punk Rocker
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<b>PUBLICATIONS</b>	<p>Author 1, Author 2, and Author 3. "Paper title 1." In Proceedings of the CONFERENCE NAME (CONFERENCE ABBR, YEAR).</p> <p>Author 1, Author 2, and Author 3. "Paper title 2." In Proceedings of the CONFERENCE NAME (CONFERENCE ABBR, YEAR).</p>