Applying to PhD programs for Mathematics

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Outline

1. Introduction
   - About me
   - What goes into an application

2. My three attempts
   - Letters of Recommendation
   - Undergraduate Research
   - Undergraduate Math Courses
   - GRE Exams
   - Programs to which I Applied

3. Potential Advice - Bolstering Your Application
   - Coursework
   - Exams
   - Letters of Recommendation
   - Personal Statement
   - Undergraduate Career
Who am I?

James Gill

- Graduated from USD in 2011
- Attended Budapest Semesters in Mathematics
- “3rd” year graduate student at UC Irvine
- Applied to PhD programs **THREE** times!
- Been rejected: quite a bit
- Been accepted: also, quite a bit!
- Attended 2 different PhD programs
You will need:

a. Letters of recommendation
b. Undergraduate research
c. Undergraduate coursework
   - Undergraduate math texts
d. Math Subject GRE exam score
   - General GRE exam scores
e. Personal statement
f. Résumé
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Letters of Recommendation

1\textsuperscript{st} Attempt
1. Lukasz Pruski
2. Stacy Langton
3. Greg Severn - Physics professor

2\textsuperscript{nd} Attempt
1. Lukasz Pruski
2. Stacy Langton
3. Attila Sali - Budapest professor

3\textsuperscript{rd} Attempt
1. Lukasz Pruski
2. Attila Sali
3. Nick Proudfoot - Oregon professor

Note:
I believe a professor that knows you very well, a professor that studies your desired area, and a professor that is highly regarded is a good mix.
S.U.R.E - Summer Undergraduate Research Experience

Summer program through USD.  ▶ SURE program website

- Participated after Sophomore year - with Dr. Pruski
- Studied stochastic differential equations with Brownian motion to model long term stock indices.

Main Takeaways

Experience with C-programming; self-taught learning; reading/writing about research; poster presentation at conference.
Undergraduate Research

R.I.P.S - Research in Industrial Projects for Students

Summer program through UCLA/Frei University Berlin.

- Participated after Junior year - in Berlin
- Studied Markov chains for the purpose of evaluating/finding clusters of nodes in graphs
- Wanted to identify important “connecting” nodes
- Funded by IBM in an effort to develop efficient drugs.

Main Takeaways

Learned MATLAB, Beamer/LaTeX; experience studying in new country and on a team; lots of graph theory/linear algebra!
### Undergraduate Math Courses

#### University of San Diego

- Logic for Math - Velo
- Calculus III - Pruski
- Linear Algebra - McGrath
- ODEs - Pruski
- PDEs - Pruski
- Advanced Analysis (Differential Real Analysis) - Hoffoss
- Advanced Analysis II (Integral/\(n\)-dimensional Real Analysis) - Langton
- Differential Geometry - Langton
- Number Theorey - Gourak
- History of Math (writing course: Galois Theory) - Langton
- Independent Study (on “Fundamental Group”) - Langton
Budapest Semesters in Mathematics

- Abstract Algebra
- Combinatorics
- Combinatorial Optimization
- Complex Analysis

Quick Tangent

Highly, highly recommend Budapest Semesters in Mathematics!

- Study abroad! Somewhere unique
- Surrounded by people also wanting to do lots of math
# GRE Exams

## Math Subject Exam

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<tr>
<th>Date</th>
<th>Score (/900)</th>
<th>Percent Below</th>
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<tbody>
<tr>
<td>Nov. 2011</td>
<td>670</td>
<td>53%</td>
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<tr>
<td>Oct. 2012</td>
<td>750</td>
<td>71%</td>
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## General Exam

<table>
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<tr>
<th>Exam</th>
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<th>Percent Below</th>
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<tbody>
<tr>
<td>Verbal Reasoning</td>
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<td>152</td>
<td>54%</td>
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<tr>
<td>Quantitative Reasoning</td>
<td>800/800</td>
<td>166</td>
<td>94%</td>
</tr>
<tr>
<td>Analytical Writing</td>
<td>4.0/6.0</td>
<td>--</td>
<td>56%</td>
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Programs of Choice

1\textsuperscript{st} Attempt
1. UC San Diego
2. University of Michigan
3. UC Berkeley

2\textsuperscript{nd} Attempt
1. University of South Carolina
2. Northeastern University
3. George Washington University
4. Oregon State University
5. University of Oregon

3\textsuperscript{rd} Attempt
1. UC San Diego
2. Rutgers University
3. Brandeis University
4. UC Irvine
Programs of Choice: Reflections

1st Attempt

- Accepted to exactly 0 programs!
- Applied to only programs ranked in top 20
- Wasn’t overly motivated
- Wanted to try working in a corporate environment
- Was the right way to go for me at the time!
2\textsuperscript{nd} Attempt

- Accepted to ALL programs!
- Applied only to programs ranked below 50
- Made two major changes
  1. Studied very hard for GRE Subject
  2. Budapest semesters letter writer
- Chose Oregon based upon campus visit
3rd Attempt

- Accepted to one program
- Feel I should have been accepted to all
- Applied to programs in 15-40 range
- Probably hindered by “transferring”
- Visited Irvine, decided to switch.
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Overview

- USD is a small school and department
- Look for programs with "low-level" graduate courses
- Take as much as possible in undergrad
- If need be, try taking a course or two at UCSD
- Highly recommend Budapest Semesters!
Exams

Overview

- GRE Subject score matters... a lot
- GRE general test, doesn’t seem to matter that much
- Can take the GRE as many times as you want, doesn’t hurt you.
Definitely want three!

Take advantage of small school to build relationships

My thoughts:

1. Someone that knows you well, worked with you a lot
2. Someone that works in your desired area of specialization
3. Someone that is highly regarded within the mathematics community.

If you can get all three in all three, that’s the best possible scenario!

Try to make sure each professor has 1 of these qualities.

And try to make sure the compilation of your letters satisfies all three.
Overview

- Difficult to say what schools are looking for
- My outline:
  1. Start with reasons I am inspired by math, leading into my recent experiences
  2. 3-4 paragraphs outlining my undergraduate mathematics career
  3. Demonstrate knowledge of professors and their work within the given department
- Have people proof-read for errors, not necessarily content
- Don’t stress so much about this part
Take advantage of every opportunity

Overview

- You aren’t at a big name school
- Seek out clubs, activities (i.e. Math Club, Math Modeling Club, Putnam Exams)
- Ask about REU’s, they want small school students
- Seek out international programs: Budapest, REUs abroad, St. Petersburg
- Do independent studies or go to UCSD
- Most importantly, take as much math as possible!