conference.program

11.1.16

9am

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| Title | Presenter Notes |

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| **Mezzanine Lounge** | with Prof. Lou Braida | | | |
| How Accurate is a Drug Test? | Maria Messick 0 1 \* | | | |
| Depth First Search: Using Computers to Intelligently Solve Mazes | | | Aritro Biswas 1 1 \* | |
| Origami Folding Algorithms: Unveiling the Mystery Behind Folded Structures | | | | Lisa Deng 1 \* | | |
| Prisoner’s Dilemma: Beating out your competition | Elizabeth Eastman 17 \* | | | |
| Counting Cards: How Google Analyzes a Billion People’s Data | | Hunter Gatewood 0 1 \* | | | |
| **Twenty Chimneys** | with Emily Zhang | | | |
| Let’s Make Things Spin! How Electric Motors Work | Priya Kikani 01 \* | | | |
| Turing Machines: The Original Computers | Nicholas Matthews 01 \* | | | |
| Callbacks in Computer Science: Stop Waiting Around! | Sean Soni 1 \* | | | |
| (no title) | Alexander Smith 07 \* | | | |
| (no title) | Christopher Desnoyers 07 \* | | | |

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| **PDR 1** | with Professor Leslie Kolodziejski | |
| PageRank: How Important is Your Website? | | Michelle Lauer 1 9 \* | |
| Optimizing an algorithm (Fibonacci) | | Sharon Kipruto 9 \* | |
| Operating Systems | | Rachel Lathe 9 \* | |
| How the Internet Works | | Ruth Park 9 \* | |
| How do we convey the glass without touching surface? | | Taeyoung Yoon 9 \* | |

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| **Lobdell Balcony** | with Remi Mirkat | |
| Dealing with a heap of money like a computer scientist | John La 8 < | |
| How to Win at Poker: Counting Strategies | | Suri Bandler 7 < |
| How to get Obama’s email | Luana Lopes Lara 9 \* | |
| How Hacking a Computer is Just Like Robbing a House | Andrew Montanez 07 \* | |

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| **Coffeehouse Lounge** | with Professor Collin Stultz and Phoebe Tse | | |
| The Universe: How we got to Now | | Christian Cardozo Aviles 17 \* | |
| Copy/Paste, Counterpoint, and Classical Music | | | Alexander Campillanos 17 \* |
| Thanks for the Memory ft. Dynamic Programming | | | Kelsey Chan 17 \* |
| How does the Internet seem to always keep you online? | | | Dayanna Espinoza-Silva 17 \* |
| Onion Routing: Maintaining Anonymity on the Internet | | | Henry Tareque 17 \* |

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| **PDR 2** | with Professor Dirk Englund | | | |
| How to Bet on Anything | | Jerry Wu 28 \* | | |
| The Physics of the MOSFET | | | Joshua Sloane 27 \* | |
| Introduction to K-Means Clustering | | | Aasavari Phanse 27 \* | |
| RSA Encryption (Or how to pass secret notes in class!) | | | Abigail Russell 28 \* | |
| Trains and Tumors: Understanding the Genes that Cause Cancer | | | | Evan Crane 027 \* |

10am

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| Title | Presenter Notes |

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| **Coffeehouse Lounge** | with Professor Collin Stultz |
| Strobe Photography: Capturing the Instantaneous | David Houle 18 \* |
| Organizing Your Music Library | Ziad Baaklini 18 \* |
| How to Get Through a Corn Maze | Connie Siu 18 \* |
| How Computers Learn Words Without Being Taught | Zygimantas Straznickas 18 \* |
| Evolution of Encryption | Ryan Stuntz 18 \* |

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| **Lobdell Balcony** | with Phoebe Tse and Remi Mirkat | |
| Bitcoin Trading with Bayesian Regression | Anvita Pandit 18 \* | |
| Things we know we can’t know | Trevor Henderson 08 \* | |
| How to Create Panoramic Images Using Computer Vision | Jose Zuniga 18 \* | |
| WARNING! Race Conditions May Result in Unpredictable Programs | | Nicole OBrien 10 \* |
| How Your Favorite iPhone and Web Apps are Built | Kevin Shum 10 \* | |
| Matter and Space | Brindha Kannan 18 \* | |

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| **PDR 1** | | with Professor Leslie Kolodziejski | | | | | | | |
| Space-time and Baseball | | | | | Zachary Hulcher 10 \* | | | | |
| How to be the World’s Laziest Programmer | | | | | Geoffrey Gilmore 10 \* | | | | |
| Sending Secret Messages Using Simple Ciphers | | | | | Karleigh Moore 10 \* | | | | |
| Putting Everything in Order – How Computers Sort Things | | | | | Jade Philipoom 10 \* | | | | |
| Did you mean… Levenshtein Automata? | | | | | William Roddenberry 10 \* | | | | |
| Letting Computers Diagnose Your Illness: Intro to Rule-Based Systems | | | | | | | | Laura Ting 10 \* | |
| **Mezzanine Louge** | | | with Professor Lou Braida | | | | | | |
| Qubits: A New Way to Compute | | | Bennett Amodio 2 \* | | | | | | |
| Ray Tracing: Generating Realistic Images by Taking Photos in Reverse | | | | | | | | Nathan Gutierrez 2 \* | |
| RAFT: Helping Your Mars Rovers Communicate | | | Carlos Henriquez 2 \* | | | | | | |
| Kolmogorov Complexity: Why most sequences can’t be easily described | | | | | | | | | Lisa Zahray 2 \* |
| How Google Maps Figures Out Which Way to Go: Dijkstra’s Algorithm | | | | | | | Annie Phan 2 \* | | |
| **Twenty Chimneys** | with Emily Zhang and Robert Ramirez | | | | | | | | |
| Strobes – Making Objects Stand Still | | | Elaine Lin 2 < | | | | | | |
| How your computer gets Google’s IP Address | | | Zachery Miranda 2 \* | | | | | | |
| How to Keep Track of Spare Parts | | | Will Reyes 2 \* | | | | | | |
| Language from a Machine’s Perspective | | | Justine Jang 22 \* | | | | | | |
| How to Move Video Game Characters | | | | | | John Stephens 22 \* | | | |
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| **PDR 2** | | | | with Professor Tomas Palacios | | | | | |
| How to Win a Game Show | | | | | | Arezu Esmaili 22 \* | | | |
| Breaking Down Words with Friends | | | | | | Garron Charles 22 \* | | | |
| Molecular self-assembly: how to easily design nanoparticles  Network Flow: What Rivers and Baseball Playoffs Have in Common  Finding the Signal Recipe: The Basics of the Fourier Transform  Complexity: Knowing How Fast Your Code Is…. Before You Write It | | | | | | Anastasia Dosca 22 \*  Theron Nipson 22 \*  Sienna Ramos 22 \*  Jose Salazar 22 \* | | | |
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11am

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| Title | Presenter Notes |

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| **PDR 2** | with Professor Tomas Palacios | | |
| Word Scoring: How Autocorrect Chooses the Right Match | | Jacqueline Liu 23 \* | |
| How does it feel to be in charge of an airline? Solving airline scheduling with flow networks | | Suyash Fulay 23 \* | |
| BitHacks: Tweaking the Nuts & Bolts of a Computer Program | | Isaac Garza 23 \* | |
| Hierarchical Modeling: How Computers Transform Bodies in Animation | | | Selina Leung 23 \* |
| Shining a Light on Solar Panels  Infinite Money: The Two Envelope Paradox | | Elizabeth Schell 23 \*  Katie Sedlar 23 \* | |

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| **PDR 1** | with Professor Leslie Kolodziejski | |
| The Tower of Hanoi Puzzle | | Nadia Lucas 11 \* |
| Use the Force (of Light) | | Kathy Camenzind 11 \* |
| How DNA Sequencing Works | | Isabel Chien 11 \* |
| From Points to Curves: How Computers Draw Art | | Catherine Li 11 \* |
| Playing Matchmaker | | Dora Tzeng 11 \* |

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| **Lobdell Balcony** | with Phoebe Tse and Emily Zhang | | | |
| How Feedback Helps You Cruise Across the Country | | | | Wei Low 23 \* |
| Drawing with Bezier Curves: The Math Behind Pixar | | | | Christina Sun 23 \* |
| How to Communicate Quickly and Efficiently: For top secret missions or just loading Facebook | | | | Marisa Rozzi 11 \* |
| How computers see images | | | | Vickie Ye 11 \* |
| Git Version Control  K-Means: From data to knowledge | | | | Megan Gebhard 7 \*  David Mayo 28 \* |
|  | | |  | |
| **Mezzanine Lounge** | | with Professor Lou Braida | | |
| The St. Petersburg Paradox | | Yanqi Chen 3 \* | | |
| LZW Compression: How to Say More with Less | | Xuan Bui 3 \* | | |
| How to Make a Pixar Movie | | Evan Denmark 3 \* | | |
| Onion Routing: How to Cleverly Communicate Covertly | | Michael Feffer 3 \* | | |
| Classification Trees: WHAT ARE THOOOSE? | | Daniel Lerner 3 \* | | |

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| **PDR 4** | with Jason Tong and Yola Katsargyri | |
| Subtle Bragging: Multi-party Computation and How it Works | | Daniel Shaar 3 \* |
| How to Simulate the Universe | Ethan Witt 3 \* | |
| Market Making: Easy Money? | Brian Saavedra 3 \* | |
| Minimax: How Computers Beat Grandmasters at Chess | David Zheng 13 \* | |
| Using Bayes’ Rule to Model How Humans and Robots Think | | Madeleine Severance 13 \* |

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| **Twenty Chimneys** | with Professor Joe Steinmeyer |
| Virtual Memory: Stop Apps from Fighting | Julian Delerme 13 \* |
| Cyberspying without code | Corey Cleveland 13 \* |
| Simultaneous Localization and Mapping | Mubarik Mohamoud 13 \* |
| Network Centralities: Who is important? | Alex Luh 13 \* |
| Fiber Optics: Connecting the World with Light  How to catch a Pokémon? | Alan Medina 13 \*  Sudhanshu Mishra 13 \* |

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| **Coffeehouse Lounge** | with Professor Collin Stultz | | | |
| Dealing with a Noisy World: Fourier Transforms and Filters | | David Gomez 19 \* | | |
| Let it Crash: Handling the unpredictable in computer programs | | | Aneesh Agrawal 19 \* | |
| The Future of Wireless Charging | Oscar Guevara 19 \* | | | |
| Strategies for Two Player Games | Steven Hao 19 \* | | | |
| How to Share Nuclear Launch Codes (and Other Secrets) | | | | Linda Liu 19 \* |
| How to Steal Passwords: SQL Injection Attacks | Julia Wu 19 \*  \* | | | |

12pm

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| Title | Presenter Notes |

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| **Coffeehouse Lounge** | with Professor Collin Stultz | | | |
| Should Everyone Get Candy? – Proof by Induction | Christina Martinez-Acha 20 \* | | | |
| How to Make Your Car Fast and Furious | | | Rita Ainane 20 \* | |
| The Vector Space Model (Or What You Should Watch Next on Netflix) | | | | Rebekah Bell 20 \* |
| Singular Value Decomposition: Capturing the essence of a picture | | Osmany Corteguera 20 \* | | |
| Understanding Radix Sort | | | Chandani Doshi 20 \* | |
| Simpson’s Paradox: Who gets more dates: Me or Brad Pitt? | | | Fernando Varela 20 \* | |

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| **PDR 1** | with Robert Ramirez and Emily Zhang | |
| Git-ting Smart With Your Files: How to Rage At Your Computer Just A Little Less | | Gregory Young 08 < |
| Size Matters | | Kevin Ng 24 \* |
| Mathematical Multitasking: In Pursuit of Better Graphics | | Andrew Reilley 24 \* |
| Conditional Probability and the Monty Hall Problem | | Jessica Fang 19 \* |
| Prisoner’s Dilemma: Why you should never trust your partner | | Mesert Kebed 08 > |

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| **Twenty Chimneys** | with Professor Joe Steinmeyer | | |
| Saving Society with Semaphores | | Anne Kelley0 14 \* | |
| (no title) | | Samantha Fierro 014 \* | |
| The Monty Hall Problem | | Cavin Mozarmi0 14 \* | |
| (no title) | | Nischal Nadhamuni0 14 \* | |
| Quantum Mechanics and You | | Narindra Peaks 14 \* | |
| The Pigeonhole Principle & Beyond: Proofs About Socks, Oranges, & Hair | | | Elysa Kohrs 14 \* |

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| **PDR 4** | with Yola Katsargyri and Jason Tong |
| How Do Bots Move So Fast? | Michael Shum 04 \* |
| Cross Site Scripting Attack | John Mikhail 04 \* |
| In Bitcoin We Trust | Nchinda Nchinda 04 \* |
| How Video Game AI Works | Raoul Khouri 014 \* |
| Handling Concurrent Conversations with CDMA | George Liang 14 \* |

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| **Mezzanine Lounge** | with Professor Lou Braida | |
| The Pirate Game: Distributing Treasure | Stuart Finney 4 \* | |
| As Fast as a Speeding Bullet | Travis Herbanek 4 \* | |
| Divide and Conquer: Solving Hard Problems by Solving Easy Ones | | Alex Huang 4 \* |
| MAC Protocols: Communication Without Conflict | | Alex Latham 14 \* |
| Data Buffers, or How Your Youtube Videos Load | Yuge Ji 14 > | |

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| **PDR 2** | with Professor Tomas Palacios | | |
| The FPGA: a million computers in one | Angus MacMullen 24 \* | | |
| Keeping Track of a Computer’s Kids | Famien Koko 24 \* | | |
| Count to infinity and beyond | Cheuk Lee 24 \* | | |
| How computers efficiently store different versions of your To-Do lists | | | Bristy Sikder 24 \* |
| Error Correcting Codes: Conveying Info with Greater Accuracy | | Kevin Yang 24 \* | |
| Scaling: Solving large problems one step at a time | Sagnik Saha 24 \* | | |

1pm

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| Title | Presenter Notes |

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| **Mezzanine Lounge** | with Professor Dirk Englund | |
| Editing DNA with CRISPR Scissors | | Helen Abadiotakis 25 \* |
| AlphaGod: How the Machine beat the Man | | Kai Aichholz 25 \* |
| Shortest-Path Finding | | Benjamin Lin 27 \* |
| Detecting Fake Data: Benford’s Law | | Tomas Calderon 28 \* |
| Grocery Shopping: The Bin-Packing Problem | | Kai Xiao 28 \* |
| How to win a billion bucks | | Alfredo Yanez 28 > |

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| **PDR 4** | with Yola Katsargyri |
| How Concerts Help Us Understand Data Storage | Kayode Ezike 25 \* |
| Quantum Cryptography: The Unbreakable Cipher | Brandon Sanchez 025 \* |
| Making Multiplication Faster with the Karatsuba Algorithm | Jennifer Tylock 25 \* |
| Using Your Cache Wisely | Douglas Kogut 025 \* |
| Why our planet is doomed: A look into Game Theory | Julian Ranz 25 \* |
| Magnetic Circuits | Tianye Chen 25 \* |

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| **PDR 2** | with Tomas Palacios | |
| Bitcoin: Magical Digital Money | Natalie Coleman 21 \* | |
| Compression: More information: less space | Joren Lauwers 021 \* | |
| Binary Search Explained: As Easy as Finding Words in a Dictionary | | Gustavo Montalvo 021 \* |
| AJAX: Stronger Than Long Load Times | Chris Womack 21 \* | |
| First-Order Circuit Filters | Juan De Jesus 21 \* | |

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| **Coffeehouse Lounge** | with Professor Kimberle Koile | |
| Reverse Engineering Smoothies with Math | Phillip Cherner 5 \* | |
| How to Control Almost Anything | Douglas Chambers 0 5 \* | |
| Why Wheels Do Strange Things On Camera | Israel Donato-Ridgley 5 \* | |
| Identity Based Encryption: The Locked Boxes and Keys in Your Computer | | Jakob Weisblat 0 8 \* |
| Hash Functions: Speedy Searches for Quicker Computers | Harrison Okun 5 \* | |

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| **PDR 3** | with Sarah Tortorici and Robert Ramirez | |
| Efficiently Find That Thing You’re Looking For | | Katie Marlowe 5 \* |
| How to get from Stanford to MIT as quickly as possible | | Rachel Rotteveel 0 5 \* |
| Reduced Size Without Reduced Detail: Reduced Repitition | | Daniel Solomon 5 \* |
| Particle Systems: Wow, that Water Looks Real! | | Reece Tamashiro 0 5 \* |
| Time Travel with Special Relativity | | David Campeau 21 \* |
| Adversarial Search: How Computers Play Games | | Jeremy Wright 21 \* |

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| **Twenty Chimneys** | with Professor Joe Steinmeyer |
| How Brain Cells Communicate – Why we laugh, learn, and love | Runpeng Liu 16 < |
| How can we measure a car’s speed using an on-board camera? | Banti Gheneti 15 \* |
| How to Send Secret Information | Lotta Blumberg 015 \* |
| How to Share a Secret | Brandon Carter 15 \* |
| Image Filtering Made Easy | Sara Stiklickas 015 \* |

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| **PDR 1** | with Jason Tong | |
| The New Password: Your Eyes | Joanna Han 15 \* | |
| Is Time Actually Money? | Nicole Lu 015 \* | |
| What is Pipelining? Do Laundry Faster and Make Netflix Load More Quickly | | Lorenzo Vigano 15 \* |
| Computer Vision for Dummies | Pravina Samaratunga 016 \* | |
| How to count Skittles quickly with MapReduce | Dang Pham 16 \* | |

2pm

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| **Mezzanine Lounge** | with Professor Dirk Englund | |
| (no title) | | Tyler Finkelstein 26 \* |
| Understand and Fix Your Slow Wifi | | Reo Baird 26 \* |
| (no title) | | William Navarre 28 \* |
| Rule-based systems: A sneak peek into Artificial Intelligence | | Adarsh Jeewajee 27 \* |
| Skip Lists – Express Trains for Lists | | Botong Ma 27 > |

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| **PDR 4** | with Yola Katsargyri | |
| Long Distance Radio Communications or How Do Our Satellites Phone Home? | Alex Sloboda 26 \* | |
| Collect Data Lazily, Get Away With It | Descartes Holland 026 \* | |
| Tell a Lie Often Enough… | Arman Rahman 26 \* | |
| Collisions in Storage: How Pigeonhole Principle Shows they are Inevitable | | Tim Zhong 026 \* |
| Parkinson’s Evil Twin | Michael Castano 26 \* | |

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| **Twenty Chimneys** | with Professor Leslie Kolodziejski | | |
| Just Google It: How Search Works | | Ismael Gomez 12 \* | |
| The Math Behind Card Counting | | Diego Cornejo 012 \* | |
| Number of Paths on the NYC Grid | | Amber Guo 12 \* | |
| How to be a Better Decision Maker | | Willow Jarvis 012 \* | |
| Understanding Circuits and Why Electrical Plugs Have Three Prongs | | | Michelle Qiu 12 \* |

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| **PDR 2** | with Phoebe Tse | |
| How to be an Efficient Doctor – The Viterbi Algorithm | Aofei Liu 28 < | |
| Friendship Paradox – Why Your friends have more friends than you | | Joy Yu 012 \* |
| How to organize your fat stacks of cash really quickly using Mergesort | Jonatan Yucra Rodriguez 12 \* | |
| Li Ion Battery Management Systems | Eric Ponce 027 > | |
| Threads and Locking, Find the Race Condition Win a Prize | Kenny Gea 27 > | |

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| **Coffeehouse Lounge** | with Professor Kimberle Koile | | | |
| Drawing Lines for Fun, Profit, and Classification (aka the joys of  linear separators | | Lei Ding 7 \* | | |
| Finding a moment in a videostack | | Ali-Amir Aldan 0 6 \* | | |
| Hacking Passwords 101 | | Nikita Kodali 8 \* | | |
| The Halting Problem A.K.A. Will Grandma Ever Stop Talking? | | Vincent Anioke 0 7 > | | |
| How to Make Your Computer Play (and win!) the Game of 20 Questions | | | Spencer Bard 7 > | |
| Gene Drives – A method for editing a species or driving it to extinction | | | | Damien Martin 8 > |

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| **PDR 3** | with Sarah Tortorici |
| Winning Board Games without any Real Skill | Keith Galli 6 \* |
| Mr. Steal Your Prom Date | Sravya Bhamidipati 0 6 \* |
| How to be a Particularly Good Finder | Jackie Liu 6 \* |
| How To Make Super Babies | Crystal Pan 0 6 \* |
| How to prove things certainly exist, by only proving that they probably exist | Michael Wallace 6 \* |

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| **PDR 1** | with Jason Tong |
| How to Share Secrets With Your Friends | Edward Park 16 < |
| Your computer perceiving the world. Why you and your computer both trip-up on the McGurk effect. | Alexander List 016 < |
| How Computers Remember Your Cat Videos | Leopoldo Calderas 16 \* |
| Traveling for Cheap: How to Find the Cheapest Flight Paths Around the World! | Danielle Penney 016 \* |
| Solving mazes with Depth First Search | Gregory Hui 16 \* |

Special thanks to:

Katherine Touafek (School to Careers Partners)

Dave Medvitz (Pingree)  
Benadette Manning (Fenway)

Michele Goe (O’Bryant)  
Bob Hall (Newman)  
Jason Tong (MIT)

my.notes