The Math Educational Resources Wiki

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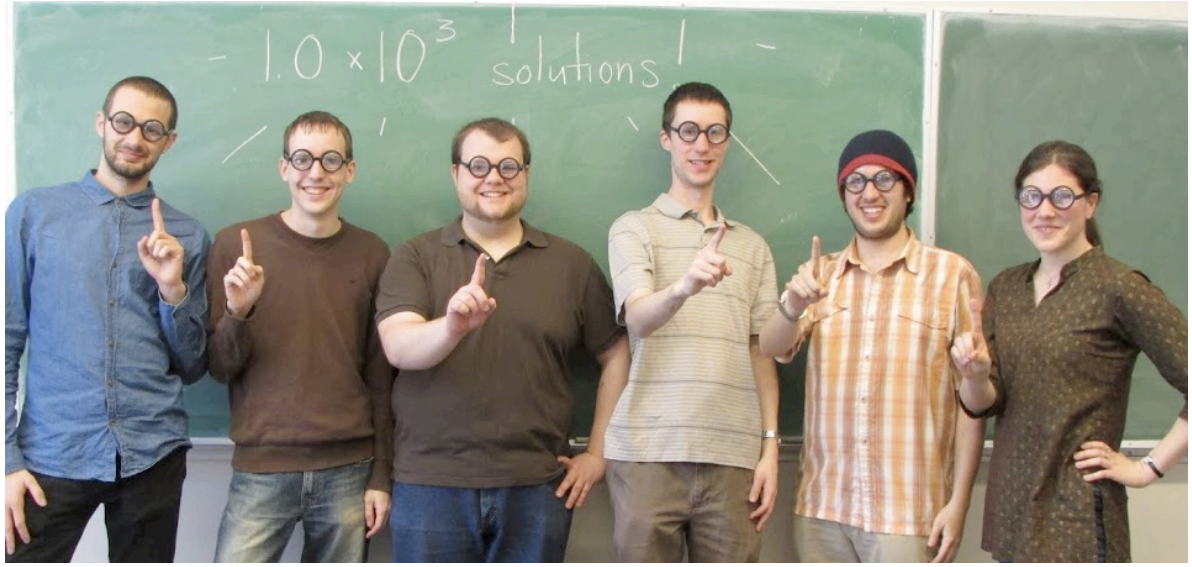
On behalf of the entire MER wiki team

The University of British Columbia



Our Resource

http://wiki.ubc.ca/Science:Math_Educational_Resources

@MERwiki

Welcome to the
Math Exam / Education Resources wiki

a place to learn about mathematics
created by the UBC mathematical community

Featuring over 1000 fully solved questions for 39 complete UBC math exams sorted by 102 categories.

MER Satisfaction Evaluation
Love the wiki? Hate the wiki? Please let us know in our 5-minute feedback survey

Solution writing contest
Add a solution, win cash prizes

How to use this resource · How to contribute

About · FAQ

Resources by Course

Math 100/180
Differential Calculus with Applications to Physical Sciences and Engineering
complete exams: 3
exams in progress: 0

Math 101
Integral Calculus with Applications to Physical Sciences and Engineering
complete exams: 9
exams in progress: 0

Math 102
Differential Calculus with Applications to Life Sciences
complete exams: 2
exams in progress: 0

Math 103
Integral Calculus with Applications to Life Sciences
complete exams: 5
exams in progress: 2

Brief History of the MER Wiki

- Math Department makes past exams publically available.
- Previous to the wiki, exam solution packages were printed off in hard copy and sold to students.
- In February 2012 math graduate students decided to collaborate and make the solutions to these exams free to students.
- Our goal: improve quality of content, system of content delivery, allow student interaction.
- The wiki structure is easy for new contributors, great to work collaboratively and intuitive to use.

Achievements and Vision

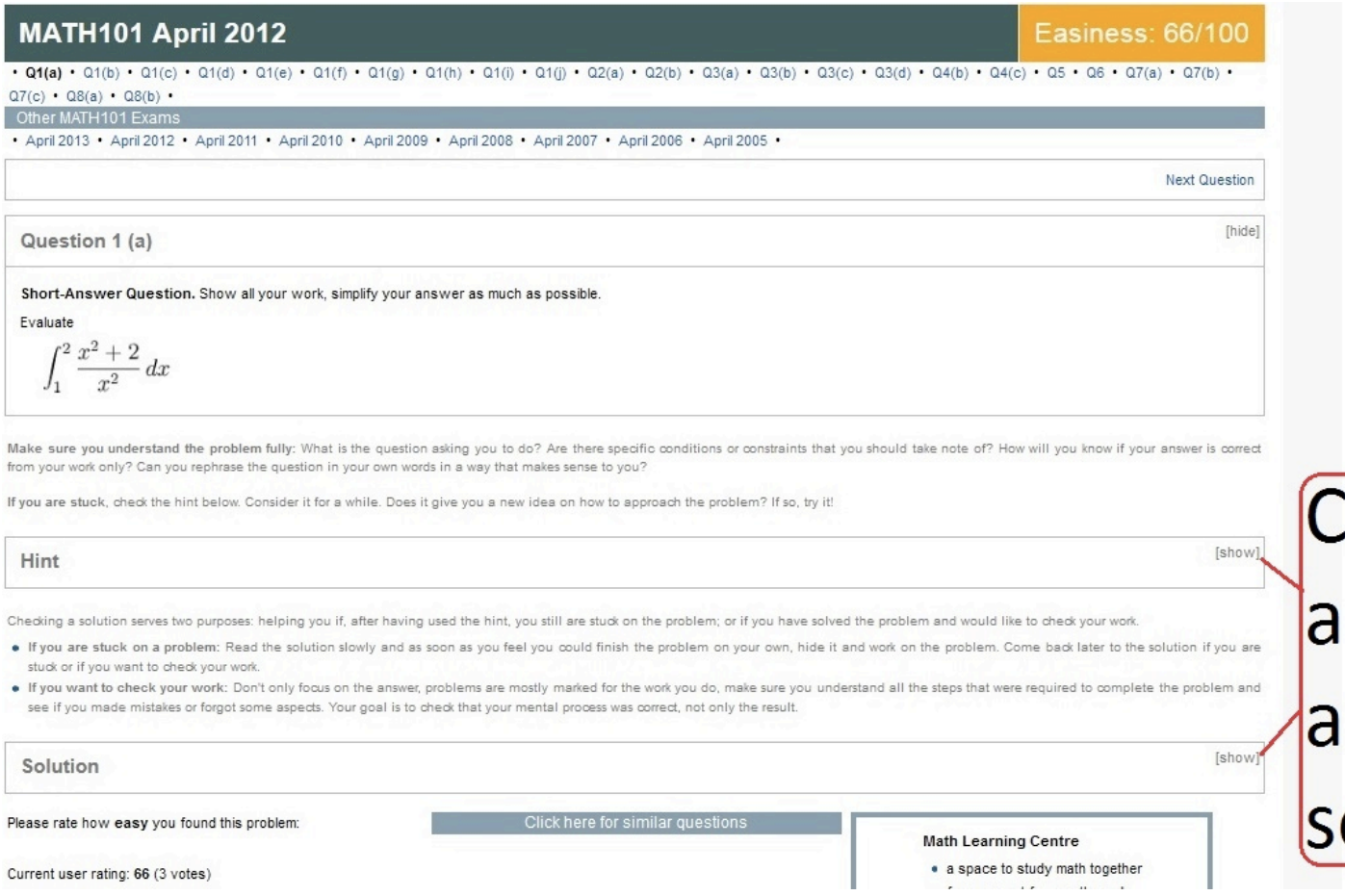
How far has this volunteer effort come in two years?

- 40 complete exams, over 1000 fully written hints and solutions from about 35 contributors.
- Added several dynamic and interactive features over time, like tagging system, course syllabus, rating bar, videos, and more.
- Extensive student usage - over 800,000 views!

Our Vision

- Make this the best learning resource possible for undergraduate students taking math courses at UBC.
- Support instructors in the UBC Math Department.
- Be a role model for similar initiatives in other departments.

More Than 1000 Exam Pages Like This One!



MATH101 April 2012 Easiness: 66/100

• **Q1(a)** • Q1(b) • Q1(c) • Q1(d) • Q1(e) • Q1(f) • Q1(g) • Q1(h) • Q1(i) • Q1(j) • Q2(a) • Q2(b) • Q3(a) • Q3(b) • Q3(c) • Q3(d) • Q4(b) • Q4(c) • Q5 • Q6 • Q7(a) • Q7(b) • Q7(c) • Q8(a) • Q8(b) •

Other MATH101 Exams

• April 2013 • April 2012 • April 2011 • April 2010 • April 2009 • April 2008 • April 2007 • April 2006 • April 2005 •

Next Question

Question 1 (a) [hide]

Short-Answer Question. Show all your work, simplify your answer as much as possible.

Evaluate

$$\int_1^2 \frac{x^2+2}{x^2}\,dx$$

Make sure you understand the problem fully: What is the question asking you to do? Are there specific conditions or constraints that you should take note of? How will you know if your answer is correct from your work only? Can you rephrase the question in your own words in a way that makes sense to you?

If you are stuck, check the hint below. Consider it for a while. Does it give you a new idea on how to approach the problem? If so, try it!

Hint [show]

Checking a solution serves two purposes: helping you if, after having used the hint, you still are stuck on the problem; or if you have solved the problem and would like to check your work.

- **If you are stuck on a problem:** Read the solution slowly and as soon as you feel you could finish the problem on your own, hide it and work on the problem. Come back later to the solution if you are stuck or if you want to check your work.
- **If you want to check your work:** Don't only focus on the answer, problems are mostly marked for the work you do, make sure you understand all the steps that were required to complete the problem and see if you made mistakes or forgot some aspects. Your goal is to check that your mental process was correct, not only the result.

Solution [show]

Please rate how **easy** you found this problem:

Click here for similar questions

Math Learning Centre

- a space to study math together

Current user rating: **66** (3 votes)

Click for a hint and a solution!

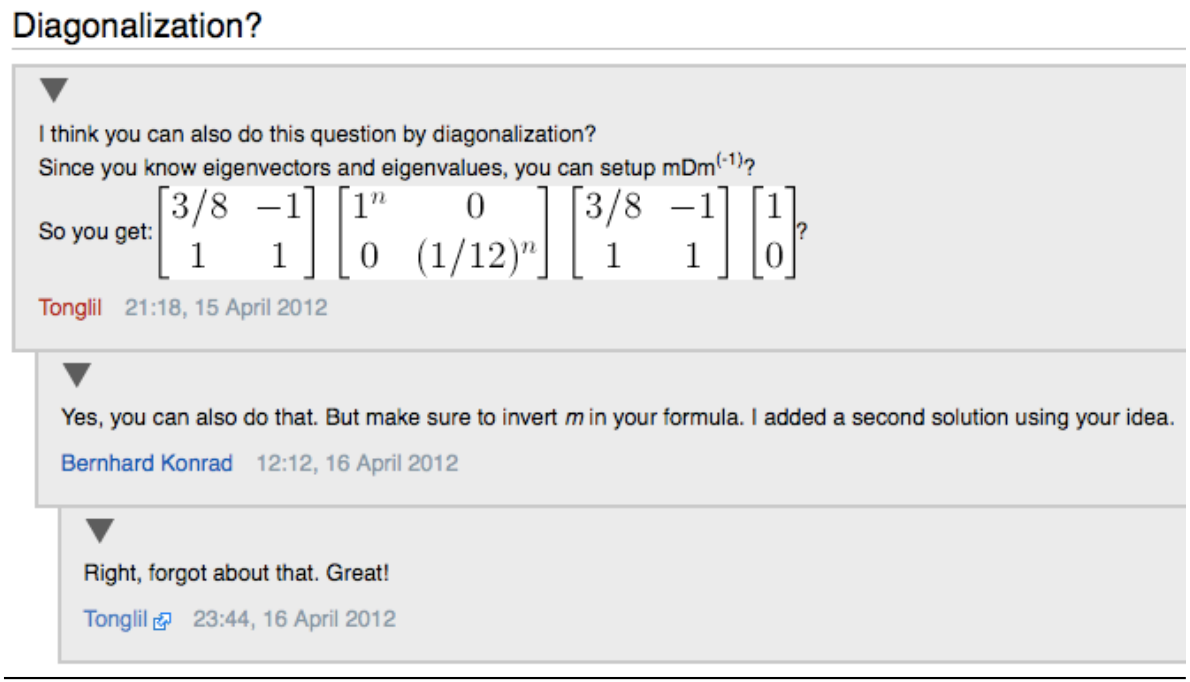
Peer Reviewed Content

All content is peer reviewed. This is a *common workflow:*

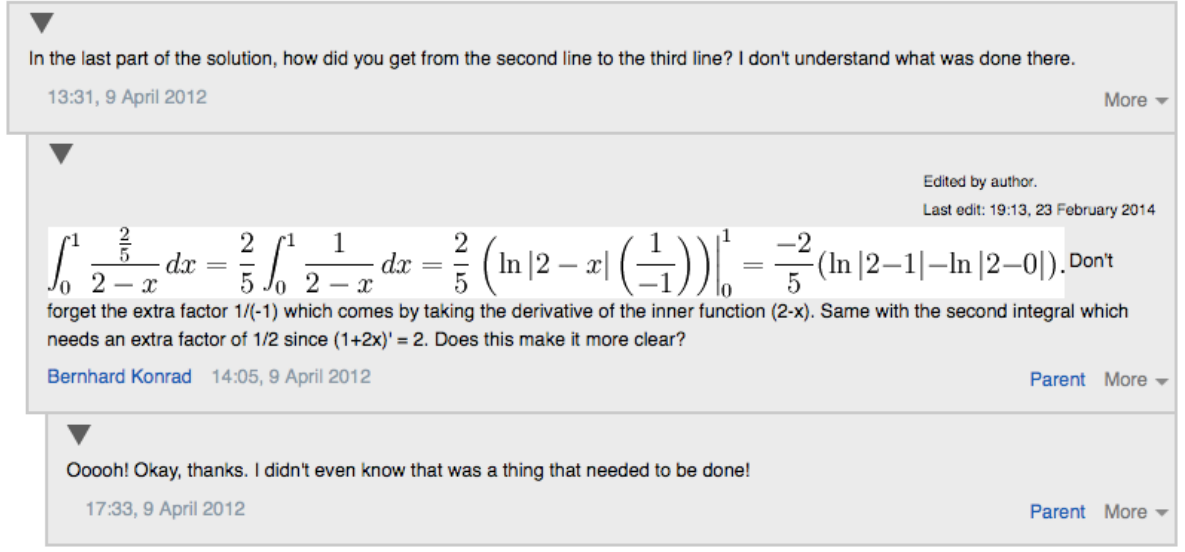
- **Contributor A**: Adds question statement.
- **Contributor B**: Reviews question statement. Also adds hint and solution.
- **Contributor A**: Approves the hint, leaves a note on the discussion page that the solution should be more clear.
- **Contributor C**: Edits solution.
- **Contributor A**: Approves edited solution.

Student Interaction

Students suggest corrections and alternate solutions:



Students can also ask for clarification to improve their understanding:

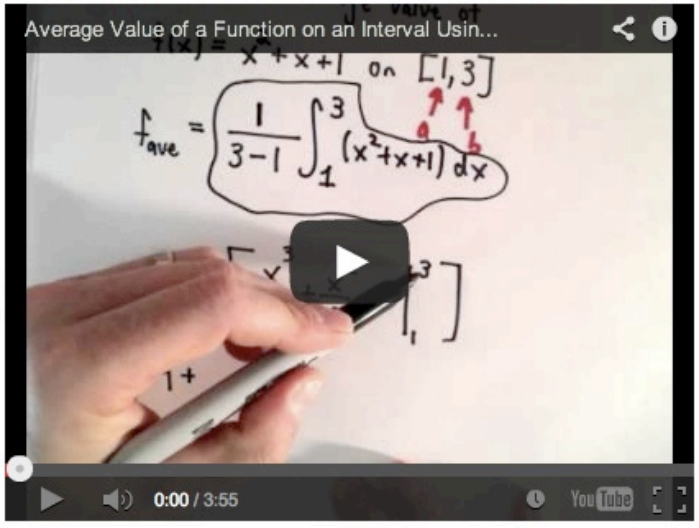


Tagging by Topic

Category:MER Tag Average value

Videos are brought to in part by PatrickJMT

Here is a video with a sample average value computation.



All exam questions on this topic

MATH 101

- April 2012 Question 01 (d)
- April 2011 Question 01 (c)
- April 2010 Question 01 (c)
- April 2009 Question 01 (f)
- April 2007 Question 02 (b)
- April 2006 Question 01 (a)
- April 2005 Question 01 (b)

Individual exam questions are tagged by topic.

Most topic pages contain instructional videos (from PatrickJMT on YouTube).

All relevant exam questions across all courses are listed.

Dynamic Syllabus

General Course Info

Visit the course main page here.

Midterm 1: Tuesday, Feb 4th 2014, 6:30-7:30 pm
Midterm 2: Wednesday, Mar 12th 2014, 6-8 pm
Day of final exam: Thursday, April 24th 2014, 8:30am

Available Practice Exams

- April 2013
- April 2012
- April 2011
- April 2010
- April 2009
- April 2006
- April 2005

Dynamic Course Syllabus

The full **course syllabus** can be found here.

1. Area, Volume and Sigma Notation

Learn about geometric series

Learn about summations

2. Riemann Sums and Integration

Learn about Riemann sums

Learn about properties of integrals

3. Fundamental Theorem of Calculus

Learn about the Fundamental Theorem of Calculus

To connect the MER closer to ongoing courses during the term, we organized content according to the course syllabus.

This allows students to follow along with exam practice problems as they proceed through the topics of the course.

Student Tag Use

Science:MER/Lists/Popular tags

< Science:MER | Lists

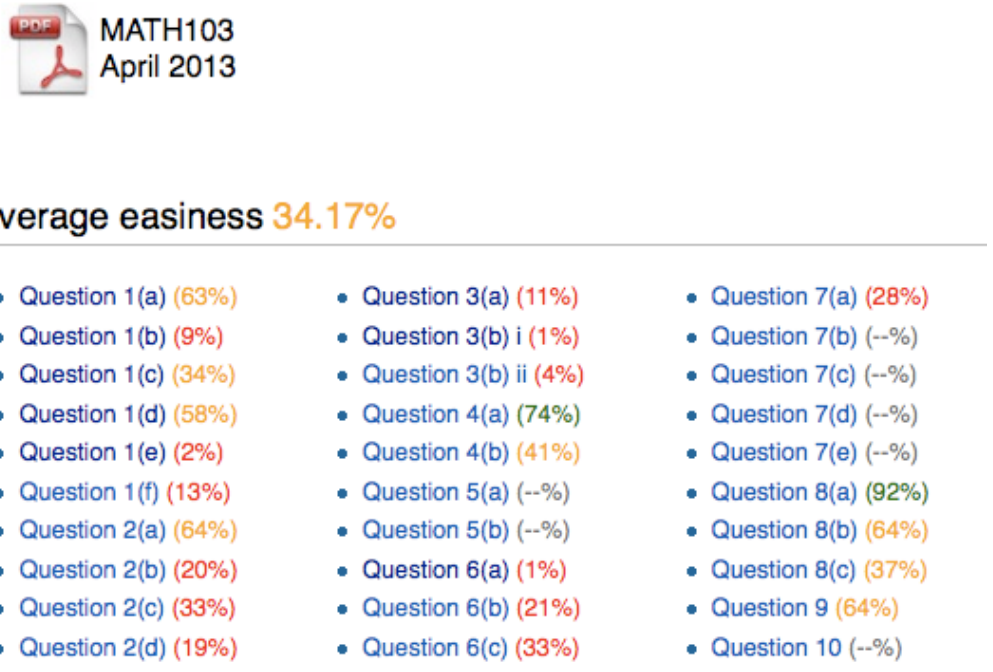
- Riemann sum (2,668 views)
- Fundamental theorem of calculus (1,947 views)
- Solid of revolution (1,700 views)
- Probability density function (1,638 views)
- Improper integral (1,274 views)
- Substitution (1,243 views)
- Geometric series (1,243 views)
- Trigonometric substitution (1,190 views)
- Integration by parts (1,094 views)
- Partial fractions (1,003 views)
- Integration using symmetry (455 views)
- Simpson's rule (444 views)
- Sequences (404 views)
- Cumulative distribution function (397 views)
- Mean (continuous) (390 views)
- Trapezoidal rule (375 views)
- Standard deviation (continuous) (350 views)
- Concavity (338 views)
- Separation of variables (322 views)
- Integrals that cycle (319 views)
- Partial derivative (311 views)

For the Jan. - Apr. 2014 term we implemented the dynamic syllabus and fully tagged questions. Student use is reflected in the number of views per tag.

The most popular tags all pertain to integral calculus, suggesting that students studied for their classes and midterms using the appropriate topic tags.

The Rating Bar

At the bottom of every question a rating bar asks students to vote on how easy they perceive the problem.

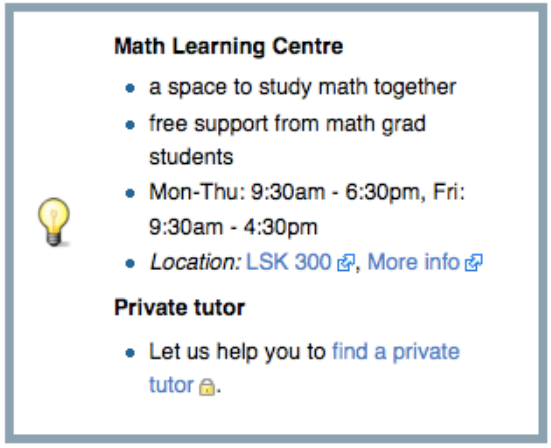


This rating can then be used by other students to help sort exam questions by easiness and it can help instructors by suggesting problems/topics for future exams that give balanced difficulty.

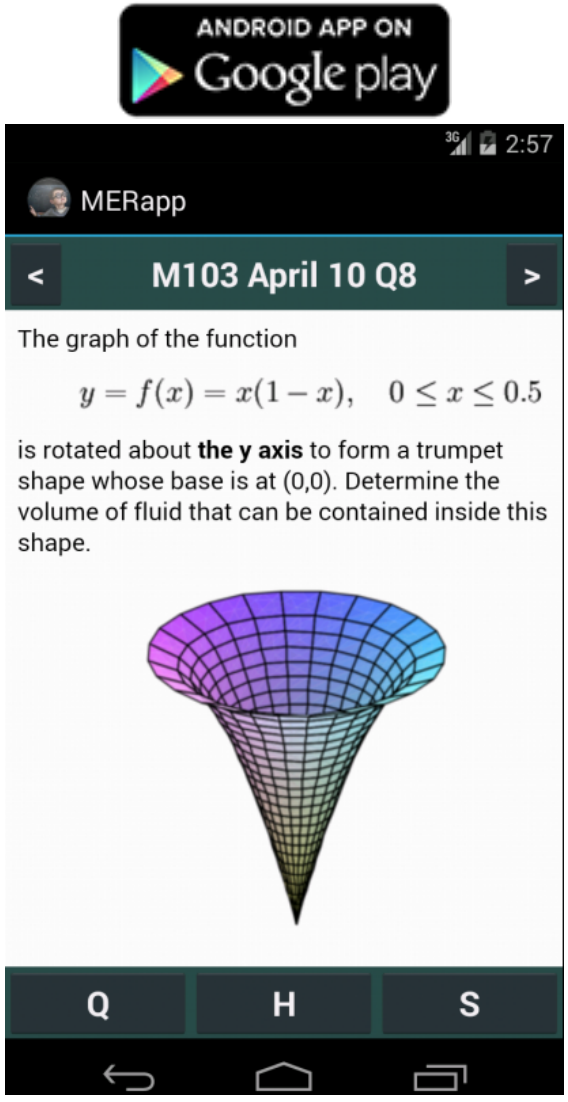
Our Latest Features

Additional help

Each question page informs about additional help in the Math Departments Leaning Centre or finding a private tutor.



Android App



Solution contest

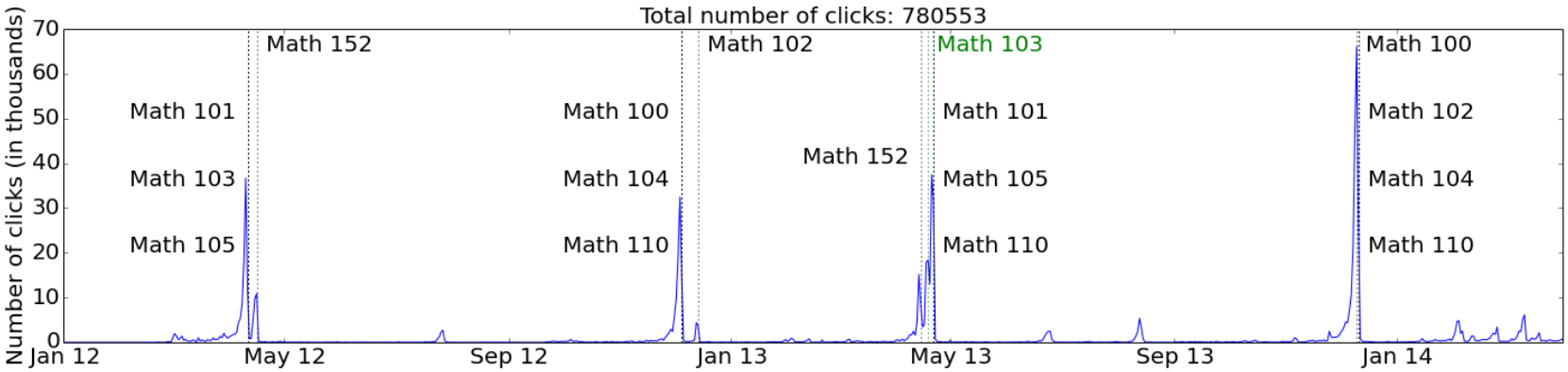
In a solution writing contest students can suggest solutions and win cash prizes.

Exam prep sessions

For the April 2014 exam period we offer free prep sessions on general study tips and how to use the wiki most effectively.

General Usage Data

This graph displays total clicks per day over the lifespan of the MER wiki.



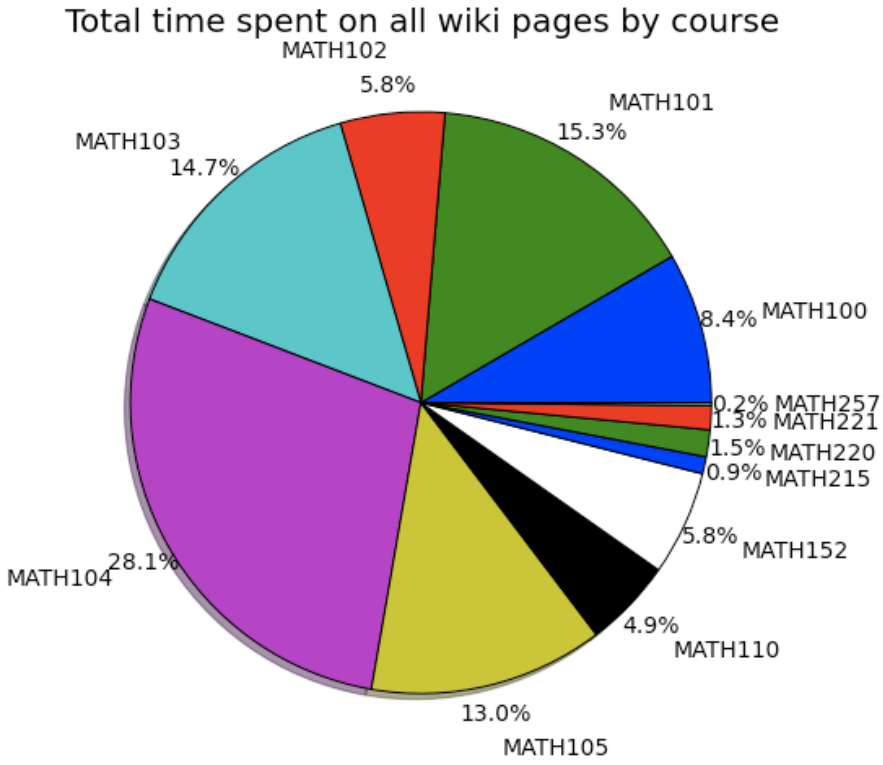
Usage spikes in a big way around exam time! Can you guess when summer school exams were held?

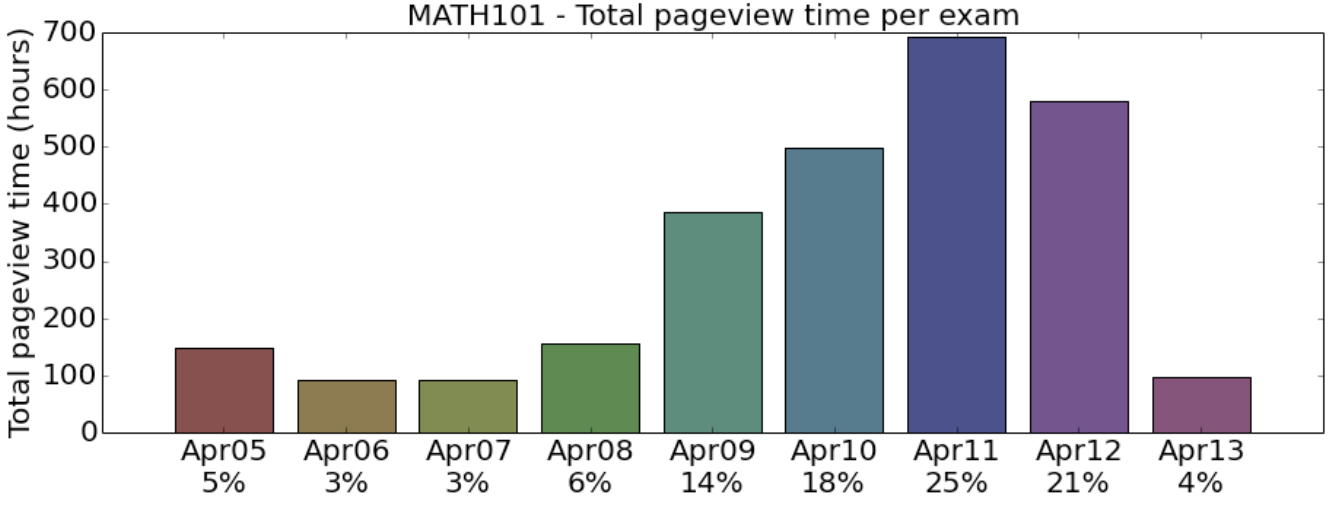
Notice that there are new bumps near midterm time in February and March 2014. This is because students use the dynamic syllabus to study by topic, not just around final exam time.

More Detailed Google Analytics Data

We also determined the breakdown of time spent per course, and per exam by course (among other things).

This information can help tell us about student study habits.





Research on worked examples

Question: Are worked examples useful for students or harmful?

Research suggests that

1. Students who see worked examples and conventional problems versus only seeing conventional problems do better on test questions containing similar problems (Sweller-Cooper ’85), (Cooper-Sweller ’87), (Paas-Van Merriënboer ’94).
2. Students also spend less time on worked examples than on conventional problems (S-C ’85), (C-S ’87), (P-V M ’94).
3. Students who are in the worked example group also can perform better and spend less time on transfer problems (that is, examples not identical to the practice ones) provided the variance in difficulty is not too large (C-S-V ’87), (P-V M’94)

Moving Forward

Possible future directions

- Add non-exam questions and “fill in the details” solutions.
- Complete and develop the topic tagging structure.
- Increase sustainability.

Funding through TLEF

- Evaluate effectiveness of resource through surveys and interviews.
- Add features as suggested by the above evaluation.

We are very thankfull to Warren Code, Eric Cytrynbaum, Will Engle, Gillian Gerhard, Wes Maciejewski, Scott McMillan, Cindy Underhill, and the CTLT IT team for ongoing support and advice.