

Strategies for Success in Mathematics Courses



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Transitioning to University Math

**University math courses are VERY different
from high school courses!**

This means that most of you will have to make
changes to the way you study mathematics

Transitioning to University Math

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Tips for Success in First-Year Math

- How to study mathematics
- How to approach problem solving
- How to study for and take tests
- When and how to get help

Active Study vs. Passive Study

- Take responsibility for your learning
- Attend class
- Be an active participant in class
- Ask questions in class
- Ask questions outside of class
- Good study habits throughout the semester make it easier to study for tests

Studying Math is Different from Studying Other Subjects

- Math is learned by doing problems
- Keep up
- Identifying and learning the key concepts means you don't have to memorize much

University Math is Different from High School Math

- The pace of university math classes is faster
- Tests cover more material
- You need to budget more time to study outside of class
- Problems are more challenging

Problem Solving

- Problem types:
 1. Problems testing memorization
 2. Problems testing skills
 3. Problems requiring application of skills to familiar situations
 4. Problems requiring application of skills to unfamiliar situations
 5. Problems requiring that you extend the skills or theory you know before

applying them to an unfamiliar situation

- In university math classes, problems are not restricted to types 1, 2, and 3
- The practice you get doing homework and reviewing will make test problems easier to tackle
- Polya's stages of problem solving:
 1. Understand the problem
 2. Devise a plan
 3. Carry out the plan
 4. Look back

Studying for a Math Test

- Everyday study is a big part of test preparation
- Do homework when it is assigned
- Practice solving problems is essential
- Ask questions as they arise
- Ask for hints when you are stuck, but ultimately you need to practice solving problems independently since this is what you will be tested on
- Review each section, review your notes, and check that you can still do the homework problems
- Use the worked examples in the text and notes – hide solutions and do them yourself
- Discuss material with others in your study group
- Work problems from review sections at the end of chapters and work old tests if you can find some
- When working on practice problems, write out complete solutions
- Start studying early
- Get enough sleep the night before the test

Taking a Math Test

- First look over the entire test
- Do problems in the order that suits you
- If you get stuck on a problem, come back to it later
- Demonstrate what you know by making your solutions easy to follow, justifying the steps where needed – practice at writing out complete solutions to homework problems will help you to get more credit for your solutions to test problems
- Do not give up on a multi-part question if you cannot do the first part.

- Read the questions carefully and do all parts of each problem
- Verify your answers
- If you finish early, check your solutions

Getting Help

- Get help as soon as you need it
- Ask questions in class
- Visit your instructor's office hours
- Ask others in your study group
- Go to the drop-in help centre
- Do not be afraid to ask questions
- Learn how to ask good questions
- You control the help that you get

Tips for success in first year math

- How to study mathematics
- How to approach problem solving
- How to study and take tests
- When and how to get help

Difference between math courses and other courses:

New topics are built on older topics - solid foundation of prerequisite material is essential.

Math is learned by **doing** problems. **Do** the homework.

You are expected to read the text, work through examples, practice more than just the assigned homework questions.

1 hour of lecture → 3 hours of study

Cramming for exams will not work!

Thought:

Mathematics is not a spectators sport.

George Polya (1887-1985)

Active Study vs. Passive Study

- Take responsibility for your learning
- Attend classes
- Be an active participant in class
- Ask questions in class; come prepared
- Ask question outside of class (instructor, TA, your classmates)
- Good study habits during the semester make it easier to study for tests

University math is different from high school math

- The pace of university math classes is much faster
- Tests cover more material
- You need to budget more time to study outside of class
- Problems are more challenging
- Instructors expect you to understand the material, not just remember formula and examples

Things to think about:

Pick up your marked homework assignments and tests

Check your homework solutions for ALL questions

When do you plan to start studying for tests/exam?

Will you study in a group, by yourself, or a bit of both?

Look over your midterm tests carefully and revise.

Make sure you try enough of the **HARD** problems in the text

Thought:

If you keep doing what you've always done, you'll keep getting what you've always got.

Zig Zigler

Learn from your home work and midterms to do better

Problem solving

- Problem types

1. Problems testing memorization
2. Problems testing skills
3. Application to familiar problems
4. Application to unfamiliar problems
5. Extending the theory you know to unfamiliar situations

In university math classes you will encounter MORE than just types 1,2 and 3!

Problem solving

- The practice you get doing homework and reviewing will make test problems easier to tackle
- Stages of problem solving:
 1. Understand the problem
 2. Make a sketch
 3. Try a simpler problem
 4. Guess some possible answers
 5. Look back and reflect upon your work

Plan now to prepare for Exams

Attend classes! Everyday study is a big part.

Do all the homework; start early (write out complete soln)

Learn from past mistakes;

- reflect on homework and midterms; you can learn from these!

Regular review - review wisely!

Use the text; examples, exercises, review questions

Optimize your learning style; manage your time
(eg. don't just work on "easy" problems)

Develop your own practice questions and exams

Develop and follow a study schedule

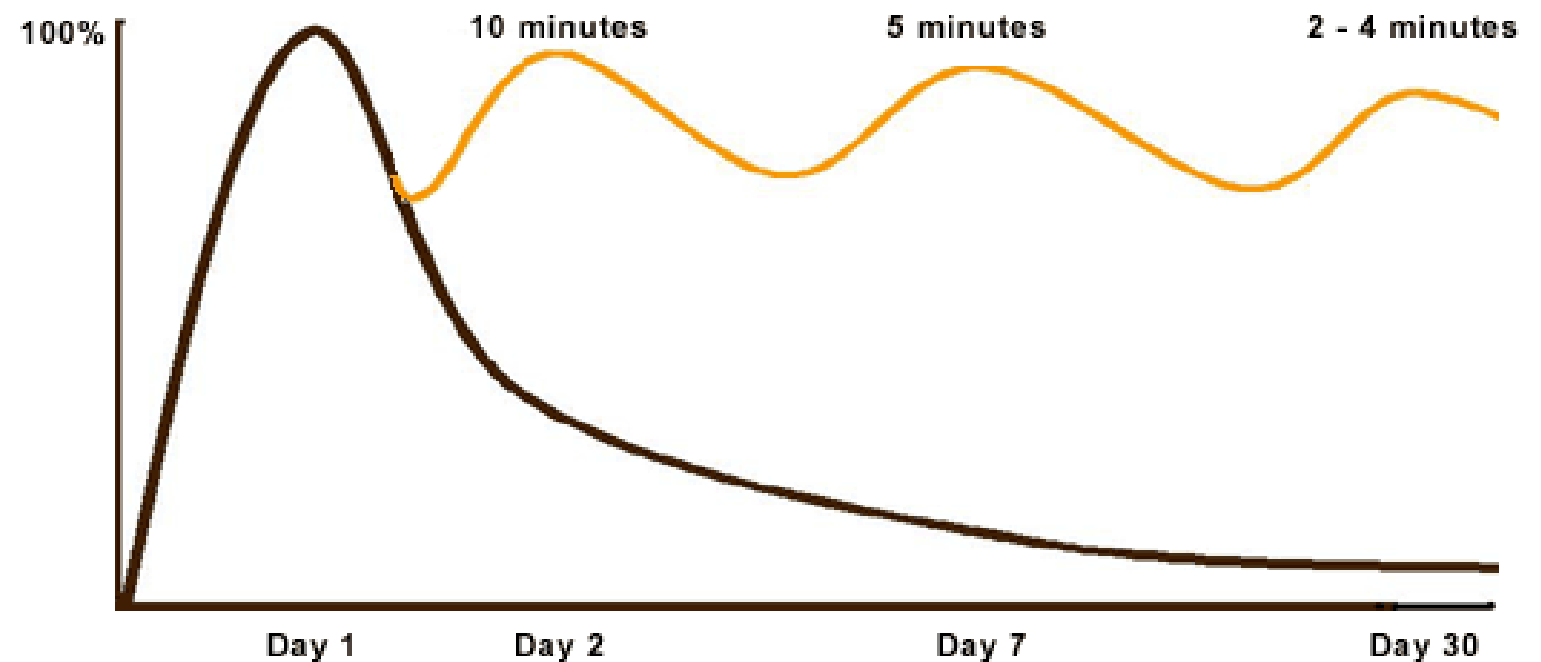
Prepare your own "cheat sheet" (study sheet)

Regular Review:

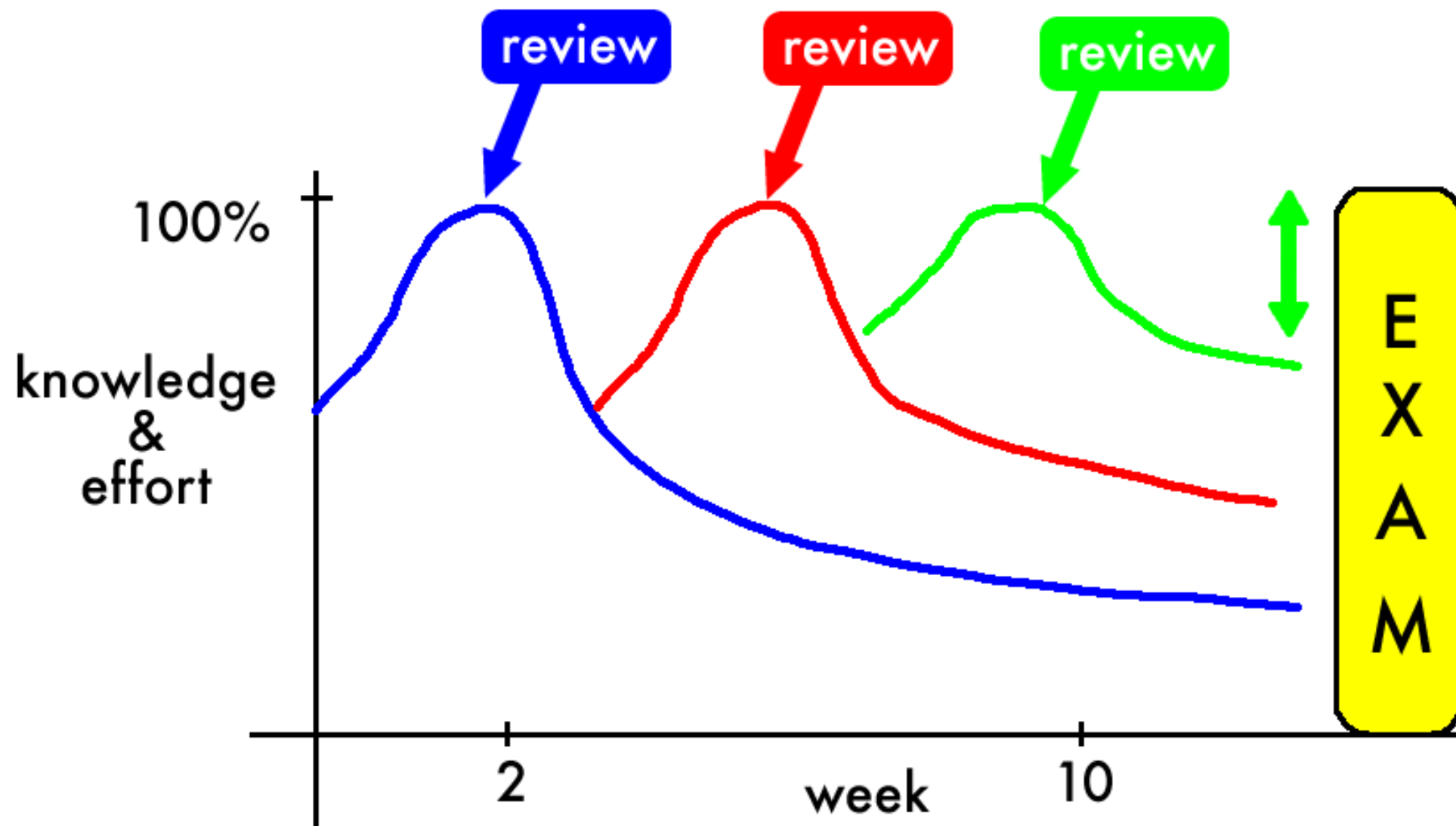
Review lecture notes

- **Within 24 hours**
- **Weekly**
- **1 - 3 weeks pre-exam**

Curve of Forgetting

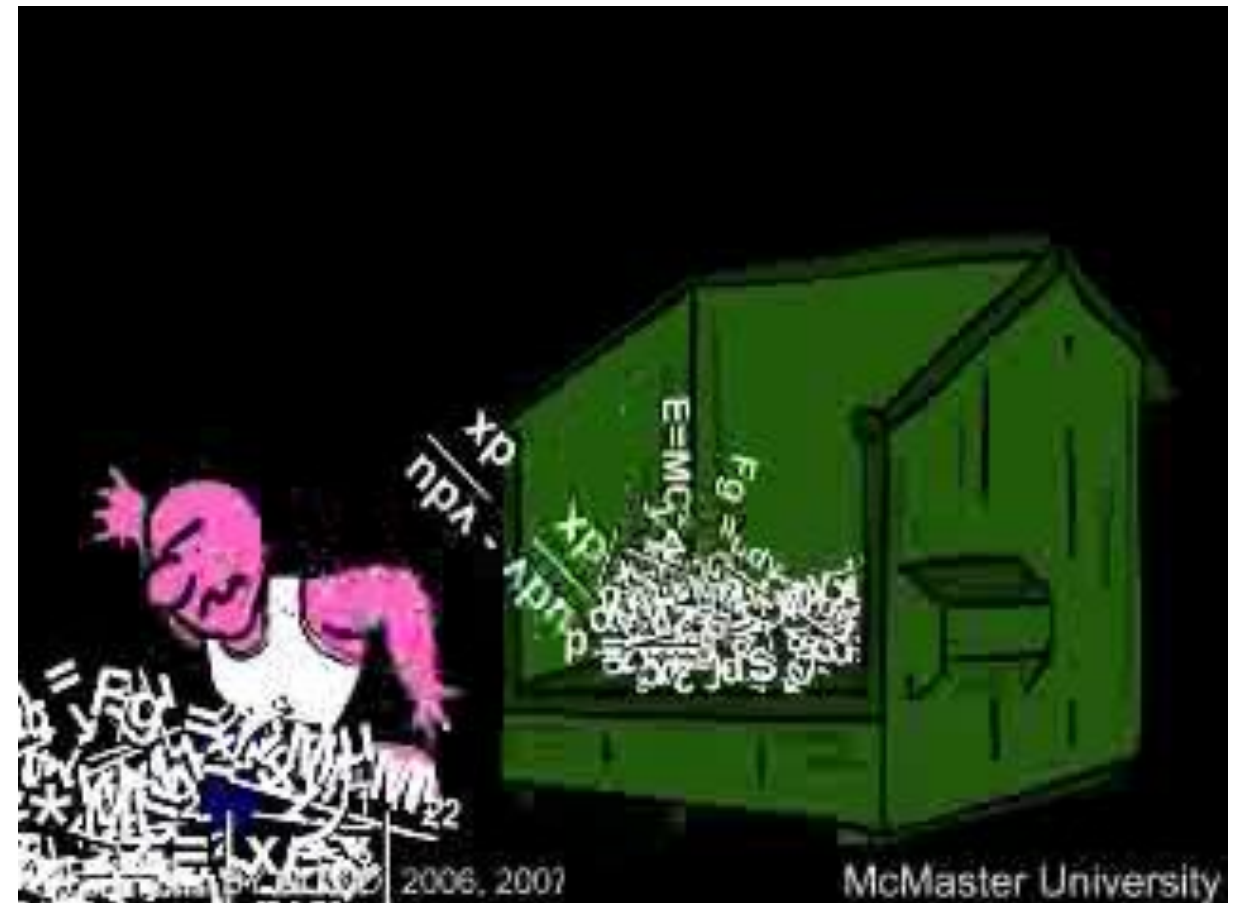
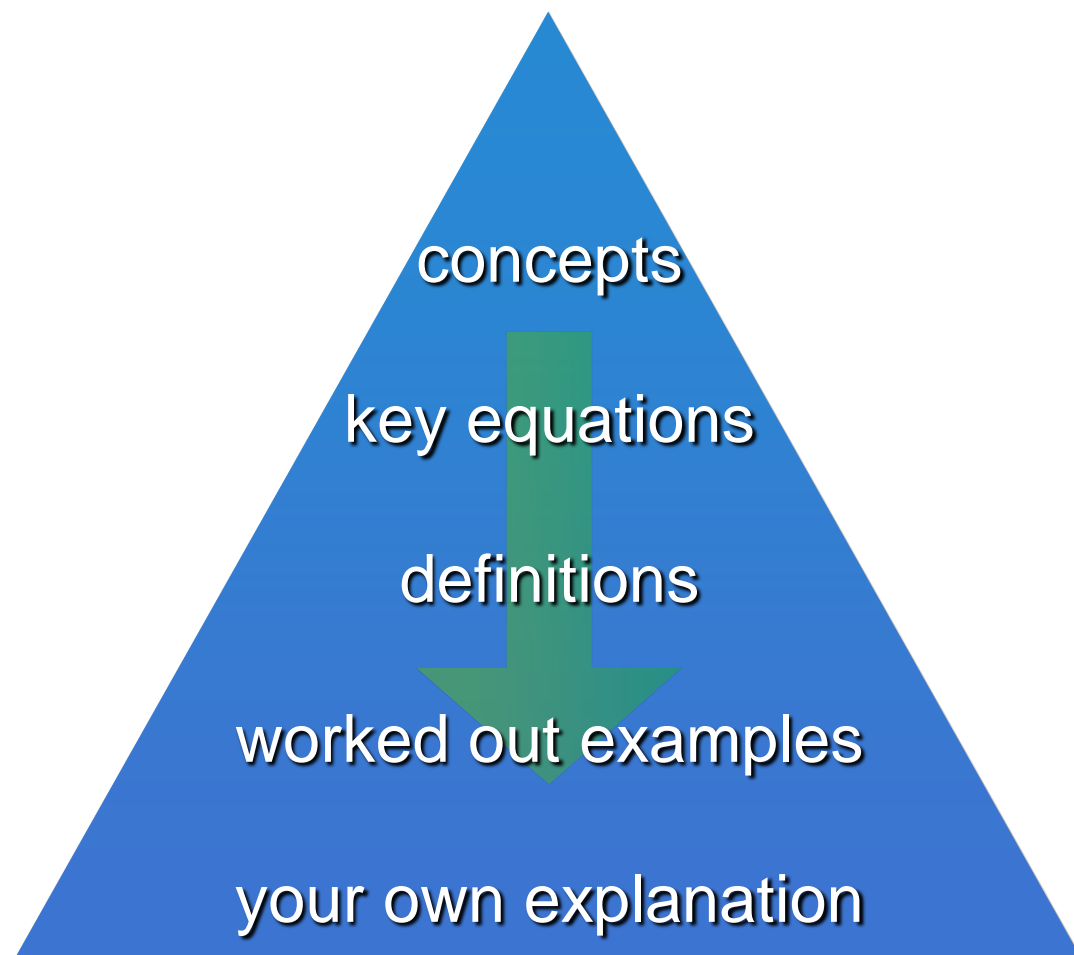


Reviewing Effectively:



review material frequently during the term

How do you organize information?



Organize material; prepare a summary sheet

Concept Summary



Heading or
Title of Concept

Key
Equations/Formulas/Facts

Definition of Each Term

Additional Information

Your Own Example or
Explanation

Preparing for tests/exams: What should you try

Start well in advance, breaking your study into chunks

Identify your weaknesses (in understanding)

Study “from the top down” (big concepts to specific examples)

Study by stimulating your memory. (what examples are illustrating this concept? Definitions?)

End each study session with 15 minutes of reflection

Practice writing tests

Take in no new material the night before a test

Expect the unexpected! (eg. new questions, “What if...”)

Taking a math test

- First look over the entire test
- Do problems in the order that suits you
- If you get stuck on a problem, come back to it later
- Demonstrate your knowledge; write out complete solutions that are easy to read (practice by writing complete solutions for homework problems)
- Do not give up on multi-part questions if you cannot do the first part
- Read the question carefully and make sure you do all parts
- Check your solutions

Tests are stressful, but don't panic!

SHOE



Getting help

- Get help as soon as you need it
- Ask questions in class
- Visit instructor's office hours
- Ask others in your study group
- Go to the Open Lab
- Do not be afraid to ask questions (email is ok, but in person is better)
- Learn how to ask good questions (identify what it is that you are getting stuck on)

Magic Key

Start studying from the first day of the semester, and have a plan.

2. Read the textbook, and other required or recommended material.
3. Do your homework!
4. Treat your homework and midterms as learning opportunities: pick up and revise your papers, make sure you understand your mistakes.
5. Organize a study group. Learn to ask questions!
6. Review periodically - don't wait until the end of the semester!
7. Develop your own exam rituals and strategies, and mentally rehearse them in days prior to the exam.
8. Don't cram!
9. Plan last days before your exams wisely, making sure that you have enough

DON'T
"EVER"
GIVE UP



Thought:

Everyone knows that it is easy to do a puzzle if someone has shown you how.

That is simply a test of memory. The test of reasoning and understanding is to solve puzzles that you have never studied before.

W.W. Sawyer

Thought:

Trying to learn without reviewing is like trying to fill the bath without putting the plug in.

Mike Hughes

Previous years exams

<http://www.math.sfu.ca/ugrad/workshops/aw/exams100.shtml>

<http://www.math.sfu.ca/ugrad/workshops/cw/exams150.shtml>

<http://www.math.sfu.ca/ugrad/workshops/acw/exams154.shtml>

<http://www.math.sfu.ca/ugrad/workshops/acw/exams157.shtml>

<http://www.math.sfu.ca/ugrad/workshops/aw/exams232.shtml>

<http://www.math.sfu.ca/ugrad/workshops/cw/exams251.shtml>

Student's guide to first year calculus;

http://www.sfu.ca/~rpyke/math/student_guide.pdf

First Year Mathematics Survival Guide;

<http://www.math.sfu.ca/ugrad/guide1.shtml>

Preparing for Midterm 1

Alistair Lachlan

September 21, 2009

Step 1

▷ Step 1
Step 2
Step 3
(continued)
Step 4

Step 5
Summary

From the instructor gather information about what to expect:

Which sections of the text and which lectures are covered on first midterm?

Will definitions and/or theorems be asked for?

Is any kind of calculator permitted?

Is there a specific practice exam or exams supplied by the instructor?

What other information about the content of the exam is there?

Step 2

Step 1
▷ Step 2
Step 3
(continued)
Step 4

Step 5
Summary

Gather a large collection of problems and exercises

Possible sources:

- ☐ **problems supplied by the instructor for purposes of revision**
- ☐ **examples/problems worked by the instructor in lectures**
- ☐ first midterms for this course from recent terms
- ☐ problems assigned during the term

Which sources are best depends on the particular instructor. The first priority should be any practice exam and/or practice problems offered by the instructor.

Step 3

Step 1
Step 2
▷ Step 3
(continued)
Step 4

Step 5
Summary

Classify the problems:

Some categories for MATH 154:

- ☐ using the limit laws and given limits to find limits
- ☐ finding $\lim_{x \rightarrow a} f(x)$ when $f(x)$ involves $|x - a|$
- ☐ using the square-root trick in finding a limit
- ☐ finding $\lim_{x \rightarrow a} p(x)/q(x)$ when $x - a$ divides $p(x)$ and $q(x)$
- ☐ finding $\lim_{x \rightarrow \infty} f(x)$ and $\lim_{x \rightarrow -\infty} f(x)$ when $f(x)$ is a rational function
- ☐ continuity of functions defined by cases

(continued)

Step 1

Step 2

Step 3

▷ (continued)

Step 4

Step 5

Summary

- ☐ sketching graphs
- ☐ finding domain and range particularly of $f \circ g(x)$
- ☐ finding whether a given function f has an inverse and finding a formula for $f^{-1}(x)$
- ☐ exponential growth and decay
- ☐ log-linear and log-log plots
- ☐ intermediate value theorem and its application
- ☐ find a derivative using the definition of derivative

Step 5

Step 1
Step 2
Step 3
(continued)
Step 4

▷ Step 5
Summary

Practice, practice, practice

- ☐ Put aside the answers to the problems
- ☐ Practice actually writing out the answers
- ☐ Check that you have obtained the right answer and that your working is enough for full marks

Summary

Step 1
Step 2
Step 3
(continued)
Step 4

The same kinds of problems recur again and again on exams

Learn to recognize at once common types of problems **and** have at your fingertips the methods and tricks that go with them

The only way to get the facility you need is to have practiced each category enough

Step 5
▷ Summary

Do not throw away easy points on offer for knowing definitions and theorems