

# Teaching Dossier

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## 1 Teaching Statement

When students are able to appreciate the beauty of mathematics they are able to utilize its strength and rigour to achieve their potential and solve complex problems. Over the past ten years, I have accumulated more than 10,000 hours of teaching experience. There are three main pillars to my philosophy of mathematics education. First, math is inherently accessible but must be taught in a way that addresses each student's way of thinking. Second, the opportunities that open up through studying mathematics easily help motivate students to continue and love math. Third and last of all, I believe the biggest hurdle to learning mathematics is internalized anxiety about the subject being difficult. Once students are able to overcome this anxiety they are able to grow and discover math on their own.

### **Accessible Explanations in Mathematics**

Throughout the years, I have learned to assess the need of students from the front of the classroom whether I am working with a handful of students or in front of a 100 person lecture. Whenever I am in front of students, I make sure to use a variety of techniques and explanations in order to address every learning style. Through examining facial expressions and frequently asking for precise feedback (eg. "what is the definition of continuity", and not "do you understand"), I am able to gauge the level of understanding and tailor explanations and examples to the needs of the classroom.

The feedback loop that is created in my classrooms means that each time I am in front of the class, my explanations and my examples will be different. There are many different ways students prefer to absorb knowledge [4]. By consistently varying my teaching and including a balance of note writing, activities/examples, and verbal explanations, many different students will be able to follow and understand. Additionally, the idea that students are exclusively verbal, kinesthetic, or aural learners is outdated, it is important to encourage students to continually explore a variety of study strategies [4].

### **Mathematical Motivation**

The beauty and usefulness of mathematics can be utilized across disciplines – from using the logic and critical thinking to analyze court cases and criminology studies, to applying differential equations to understand the growth of populations in biology. Every student that signs up for a math course has some motivation for showing up on that first day. Once they arrive, I work hard to encourage students to continue striving for success in mathematics. This often comes in the form of encouragement and understanding in the classroom. From the front of the class I show students that I am friendly and approachable, and from there help to bridge the gap of encouragement. These ideas are supported in the research [1,2,3].

Additionally, I always provide students opportunities to give me feedback on my lessons. In doing this, students find that they have more connection to the material and feel a greater sense of responsibility which helps foster motivation [2]. During semesters that I have worked as a TA, I ran my own teaching assistant evaluations, to get direct feedback from student. It has been an honour to have seen some incredible comments from students over the years, and I have also received excellent feedback that has helped me become an even better educator. For instance, the pacing of my lectures has improved due to direct comments from students.

### **Increasing Confidence and Self-Assurance in Mathematics**

I always foster a safe and supportive environment for asking questions and making mistakes. Making mistakes is, in my opinion, the best way to learn math and to investigate the world around us. For many students, making mistakes is the scariest part of mathematics, so I always encourage new ways of looking at mistakes as stepping stones to success. Encouragement aids in learning [3]. I do this through student self-evaluations and test error analyses where I ask students to step through their solution, figure out where the mistake occurs, and how to avoid the mistake in the future. Often I will incorporate this technique during tutorials and have students Think Pair Share and go over each others solutions and analyzing the correctness. Asking students to correct their own work and teaching it to others aids in overall understanding [2].

In one instance, I was working with a student who suffered severe math anxiety. I assigned her a journal to complete each day that included: topics covered, what was easy or difficult, what she still didn't understand, and at least one concept she struggled with at first but now understands. The weekly self assessment yielded a drastic improvement in her math ability, as well as a decrease in her anxiety over math tests. This method of addressing one's own strengths and weaknesses helps students take responsibility of their learning while encouraging further study, which has been shown to increase overall success [2,3]. This idea can be incorporated into larger classes by creating a blank template or survey, and having students fill it out each week and submit it, by requiring a participation grade this will increase the number of students partaking in the activity. Alternatively, it could be given as the alternative assessment to clicker questions.

Overall I have three main philosophies when it comes to teaching. First, I believe that every student has some intrinsic math ability that, with the right teacher, can come out and help the student succeed even beyond the walls of a math classroom. Second, math is a beautiful subject that can help us unlock truths from the world around us. Lastly, I believe that the best way to teach is to help students on their own journey to discovering the beauty of math. A good math teacher can become a great math teacher by listening to students and trying to understand their solutions from their point of view. There is never just one way to come to any math conclusion, and that is true in every level of math class.

### **References**

- [1] L. Baum, Enthusiasm in Teaching, *Political Science & Politics* **35** (2002) 87-90.
- [2] A. Cook-Sather, Students as Learners and Teachers: Taking Responsibility, Transforming Education, and Redefining Accountability, *Scholarship, Research, and Creative Work at Bryn Mawr College* (2010).
- [3] M.E.P. Seligman et al., Positive education: positive psychology and classroom interventions, *Oxford Review of Education* **35** (2009) 293-311.
- [4] H. Pashler et al., Learning Styles: Concepts and Evidence, *Psychological Science in the Public Interest* **9** (2008) 106-119.

## 2 Past Teaching

### University Courses Taught

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#### WILFRID LAURIER UNIVERSITY

Spring 2019 CP 493 DIRECTED RESEARCH PROJECT I

Pending faculty approval, I will be supervising and undergraduate research student this summer. Throughout this course, the student will learn about all aspects of academic research, including a literature review of peer-reviewed research, a thorough understanding of academic writing, and some introductory research problems. We will focus on cryptosystems and network searching, specifically the game of Cops and Robbers.

Winter 2019 CP 367 SYSTEM PROGRAMMING

I coordinated all course material and assessments, and I ran weekly lab sessions where I updated existing lab material to reflect the current course content. The course materials I had access to were from an earlier calendar description, so I needed to update the course calendar, the textbook readings, etc. to reflect the new course. This involved reviewing the textbook readings and assigning a new open source textbook that more accurately reflected the way programmers use Linux in the workplace today.

Fall 2018 SC101 ESSENTIAL SKILLS FOR MATHEMATICS

I worked very closely with the course coordinator for this course. Together we designed a pacing guide for this new course and determined all learning outcomes. Each test was written together, with more of an emphasis for my part residing on the final exam (and the other coordinator's focus was on the midterms). The course outline and the final exam are included in this teaching dossier.

### Courses Assisted

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#### RYERSON UNIVERSITY

Spring 2019	MTH425 Differential Equations and Vector Calculus
	MTH510 Numerical Analysis
Winter 2019	MTH599 Foundations of Mathematical Thought
Fall 2018	AM8002 Graduate Discrete Mathematics
Summer 2018	MTH240 Calculus II for Engineers

#### AIMS CAMEROON

Winter 2018	Modeling Networks
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## RYERSON UNIVERSITY

Winter 2018	MTH310 Calculus and Computational Methods II
Fall 2017	MTH207 Calculus and Computational Methods MTH560 Problem Solving
Winter 2016	MTH312 Differential Equations and Vector Calculus MTH607 Graph Theory
Fall 2015	MTH525 Real Analysis MTH108 Linear Algebra MTH231 Modern Math II
Winter 2015	MTH607 Graph Theory MTH617 Abstract Algebra MTH231 Modern Math II MTH210 Discrete Math II
Fall 2014	MTH110 Discrete Math I MTH131 Modern Math I

## UNIVERSITY OF WATERLOO

Winter 2017	MATH138 Calculus II
Fall 2016	MATH138 Calculus II

## WILFRID LAURIER UNIVERSITY

Winter 2014	MA104 Calculus II
Winter 2013	MA104 Calculus II
Fall 2012	MA104 Calculus II
Winter 2012	MA100 Introduction to Calculus for Natural Sciences

**High School Courses Taught**

## BLYTH ACADEMY

Spring 2018	MHF4U Advanced Functions
Summer 2017	MCR3U/MCF3M Functions/Functions and Applications, Mixed Classroom MDM4U Data Management, Substitute - One Week MCV4U Calculus and Vectors
Winter 2017	MCR3U Functions MCF3M Functions and Applications MHF4U Advanced Functions
Summer 2016	MCR3U Functions, Half-Course MCV4U Calculus and Vectors, Half-Course
Winter 2016	MDM4U Data Management MHF4U Advanced Functions

### 3 Teaching References

**Dr. Lawrence Kolasa**

Professor, Ryerson University  
Course Instructor Apprenticeship Mentor  
Email: lkolasa@ryerson.ca

**Dr. Wendy Freeman**

Director of Learning and Teaching Office, Ryerson University  
Research Supervisor for Open Moments Project  
Email: wfreeman@ryerson.ca

**Yvonne Reitmeier**

Teacher, Hillfield Strathallan College  
Former Vice-Principal of Blyth Academy  
Email: Yvonne.Reitmeier@hsc.on.ca

**Dr. Anthony Bonato**

Professor, Ryerson University  
Current PhD Supervisor, Master's Supervisor  
Email: abonato@ryerson.ca

**Dr. Kathy Cameron**

Professor, Wilfrid Laurier University  
Teaching Mentor at Wilfrid Laurier University  
Email: kcameron@wlu.ca

## 4 Contributions to Teaching

### Contributions to Teaching

#### Conference Presentations

E. Meger, W. Freeman, M. Schwartz, A. Ludbrook, *Ryerson Open Moments*, Learning and Teaching Office, Presentation, Learning and Teaching Conference (2019)

Abstract:

In recent years, the development and use of Open Education Resources (OER) and Open Educational Practices (OEP) has been encouraged through a number of initiatives here at Ryerson. The Ryerson Open Moments project wants to raise awareness of OEP and OER by showing the value of participation in open projects for faculty, instructors, and students, and by sharing and illustrating open education strategies in an accessible and compelling manner. Through interviews with faculty involved with these projects, we have curated a collection of stories regarding the use of OER and OEP at Ryerson. In this talk, we will present some of the initial themes and results from these interviews. Preliminary findings suggest that while expectations for getting involved with OER and OEP vary, the values of student-centered learning and teaching are constant. The final deliverable for the project - an open book entitled *Ryerson Open Moments: Case Studies in Open Educational Practice at Ryerson* - will reinforce these ideas as it will model through its content, form and distribution the core principles of open education.

#### Textbooks and Course Notes

MA103 COURSE NOTES, Wilfrid Laurier University (2014)

In 2014 as a research assistant, I helped design and update Dr. Chester Weatherby's handwritten notes and create partially populated slides and coordinating course-pack.

This project was part of the "Success in First Year Math" research done at Wilfrid Laurier University with Dr. D. Woolford, Dr. D. Kostopolos, and Dr. C. Weatherby in the departments of mathematics and education. The goal was to examine the grade and feedback results from two subsequent years of students: one using partially populated slides, and the other using traditional board notes.

## 5 Professional Development and Outreach

### Professional Development

#### Certificates

All certificates are available upon request.

#### GRADUATE PROFESSIONAL DEVELOPMENT IN TEACHING PROGRAM LEVEL 2

Ryerson University, 2019

This program involves the completion of coursework and eight hours of workshop attendance. The aim of the program is to teach graduate students the fundamentals of teaching while giving students hands-on applications and practice. This certificate is certified by SEDA UK (Staff and Educational Development Association) who promote innovation and good practice in higher education.

#### GRADUATE PROFESSIONAL DEVELOPMENT IN TEACHING PROGRAM LEVEL 2

Ryerson University, 2019

This program involves the completion of coursework and teaching intensive training. The aim of the program is to teach graduate students the theory of learning, and give student advanced practice in teaching. This certificate is certified by SEDA UK.

#### MY GRAD SKILLS

Ryerson University, 2018

Each certificate below involved e-learning through text, video, interactive modules, and quizzes.

- Intercultural Competency; Converting a CV to a Resume; Academic and Research Integrity

#### STANDARD FIRST AID INSTRUCTOR, LIFESAVING INSTRUCTOR, AND SWIM INSTRUCTOR

Lifesaving Society, 2017, 2009 and 2009.

This teaching qualification involves in-class learning and the instruction of a full course under the supervision of a mentor. The certificate allows me to teach each of the above programs for the Royal Lifesaving Society Canada. Many of my current skills of classroom management and engagement come from my years of experience teaching in aquatics. For instance, I often try to get students up and active during lecture, sometimes in the form of mid-exam stretches or sometimes in throwing balls of paper with practice problems or reflections.

#### Courses

#### CILT 100 LEARN AND TEACH IN HIGHER EDUCATION I - Ryerson University

Course description from calendar:

This seminar will introduce registrants to teaching and learning methods in higher education. Through critical analysis of research on higher education, as well as reflection upon one's own teaching experience, participants will engage in their own professional development. This seminar is designed for individuals with all levels of teaching experience who wish to further develop their teaching skills. Topics covered include active learning, inclusivity, information literacy, statements of teaching philosophy, and presentation skills.

### CILT 105 LEARN AND TEACH IN HIGHER EDUCATION II - Ryerson University

Course description from calendar: This seminar is designed to help prepare participants for an academic career in teaching. Participants are expected to have some experience in teaching at a third-level institution. The overarching goal of this seminar is to allow participants to develop their practical teaching skills. This is achieved through engagement in pedagogical issues pertaining to higher education and the application of practical skills. The framework of this seminar is in the development of a teaching dossier.

### COURSE INSTRUCTOR APPRENTICESHIP - Ryerson University

During this program, I worked closely with my mentor Dr. Larry Kolasa for MTH207 Calculus I. Together, we designed the second Lab Test and the final exam. For the teaching component, I taught the final two weeks of the course on integration. Given the amount of time, I was able to create long term lesson plans to ensure all content was covered in advance of the final, and I made sure to include a lecture on exam review. This lecture was entirely student run. Beginning with students choosing topics, then groups. At the for the last half of the lecture, students presented a summary, worked through an example, and gave the other students an additional practice problem. While presenting, other students asked questions to solidify their understanding, and I stepped in whenever necessary to ensure accuracy of the review. We were able to fit all the topic summaries and problems across all the many whiteboards in the room. At the end of class we then had a “museum of calculus” which students could walk through and take pictures to then study off of later. Overall, this experience was an excellent introduction to large size (90) calculus classes, and I was lucky to have had excellent feedback from the students regarding my engaging lectures and knowledgability.

### Workshops

- 2019 LEARNING AND TEACHING CONFERENCE, Ryerson University  
RESUMES AND COVER LETTERS TRAINING SEMINAR, Ryerson Math Department
- 2018 LATEX TRAINING SEMINAR, Ryerson Math Department  
LEARNING AND TEACHING CONFERENCE, Ryerson University
- 2017 UNDERSTANDING ANISHINAABE HISTORY THROUGH WAMPUM BELTS, Ryerson University  
FACILITATING DISCUSSION, Ryerson Learning and Teaching Office  
SUPPORTING YOUR STUDENTS’ WELL-BEING, Ryerson Learning and Teaching Office

### Outreach and Service

- 2019 SOAPBOX SCIENCE JR. - Speaker  
WATERLOO-WELLINGTON SCIENCE AND ENGINEERING FAIR - Judge
- 2015-2018 THEMATHGIRL2718 - YouTube Channel
- 2015-2017 SCIENCE RENDEZVOUS - Math Booth Co-coordinator

## **6 Evaluations**

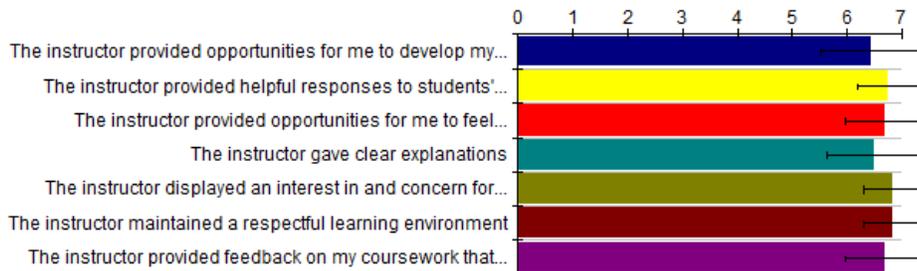
### **6.1 SC101 Fall 2018 Evaluations**

SC101 Essential Skills for Mathematics, Wilfrid Laurier University

These are the official university evaluations from Fall 2018 for Section A and Section B of the course. The summary of my results has been compiled by the university.

<b>Course:</b>	SC101 A - Essential Skills for Math	<b>Department:</b>	MA
<b>Responsible Faculty:</b>	Erin Meger	<b>Responses / Expected:</b>	13 / 28 (46.43%)
<b>Faculty:</b>	Meger, Erin		

**Category/Section: B. Questions about the Instructor/Instructor**



[G] 1=Strongly Disagree [F] 2=2 [E] 3=3 [D] 4=4 [C] 5=5 [B] 6=6 [A] 7=Strongly Agree=7

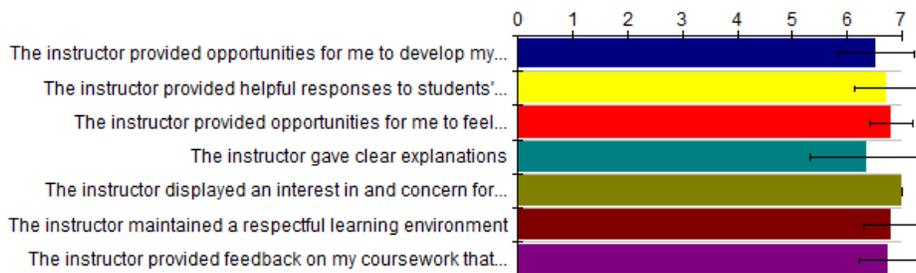
KEY	Questions	Statistics				Frequency							Response		
		Mean	Med.	Mode	Std Dev	G	F	E	D	C	B	A	Rec.	N/A*	Exp.
	The instructor provided opportunities for me to develop my interest in this subject area	6.5	7	7	.93	-	-	-	1	1	2	9	13	0	28
	The instructor provided helpful responses to students' questions and requests for guidance	6.8	7	7	.58	-	-	-	-	1	1	11	13	0	28
	The instructor provided opportunities for me to feel engaged in the learning process	6.7	7	7	.72	-	-	-	-	2	-	11	13	0	28
	The instructor gave clear explanations	6.5	7	7	.87	-	-	-	-	3	-	9	12	0	28
	The instructor displayed an interest in and concern for student learning in this course	6.8	7	7	.53	-	-	-	-	1	-	12	13	0	28
	The instructor maintained a respectful learning environment	6.8	7	7	.53	-	-	-	-	1	-	12	13	0	28
	The instructor provided feedback on my coursework that helped me improve my understanding	6.7	7	7	.72	-	-	-	-	2	-	11	13	0	28

\*NA responses indicate that the participant felt they did not have the information or experience required to respond to a question.

<b>Faculty:</b>	Meger, Erin
<b>Question:</b>	Comments about the instructor and/or course (Responses will only be seen by the instructor)
<b>Response Rate:</b>	69.23% (9 of 13)
1	Ms. Meger is a very good teacher who really cares about the success of all her students. With regards to how the material was delivered I would have benefited from more taking up of homework problems as a class and less small group work.
2	Very engaging and lovely prof!
3	the prof made math enjoyable gave great lessons that were clear and was always available for extra help which allowed me to succeed in the course
4	Erin has been an incredible professor, especially for the introduction to university. She is kind, caring and passionate about what she teaches and her students. It is very evident that Erin liked to see her students succeed and will teach the content for greatest level of success.
5	The instructor was very good at giving feedback and make room for students to improve and do well
6	Erin created a positive environment and always encouraged learning in the classroom
7	Erin was really good and actually made me understand math
8	Love the passion and drive from this professor :) really helped me find my math in pursuing a bio math major :) very thankful for professor like Erin :)
9	Shes great

<b>Course:</b>	SC101 B - Essential Skills for Math	<b>Department:</b>	MA
<b>Responsible Faculty:</b>	Erin Meger	<b>Responses / Expected:</b>	17 / 26 (65.38%)
<b>Faculty:</b>	Meger, Erin		

**Category/Section: B. Questions about the Instructor/Instructor**



[G] 1=Strongly Disagree [F] 2=2 [E] 3=3 [D] 4=4 [C] 5=5 [B] 6=6 [A] 7=Strongly Agree=7

KEY	Questions	Statistics				Frequency							Response		
		Mean	Med.	Mode	Std Dev	G	F	E	D	C	B	A	Rec.	N/A*	Exp.
	The instructor provided opportunities for me to develop my interest in this subject area	6.5	7	7	.70	-	-	-	-	2	4	11	17	0	26
	The instructor provided helpful responses to students' questions and requests for guidance	6.7	7	7	.57	-	-	-	-	1	3	13	17	0	26
	The instructor provided opportunities for me to feel engaged in the learning process	6.8	7	7	.39	-	-	-	-	-	3	13	16	0	26
	The instructor gave clear explanations	6.4	7	7	1.03	-	-	1	-	1	5	10	17	0	26
	The instructor displayed an interest in and concern for student learning in this course	7	7	7	0	-	-	-	-	-	-	17	17	0	26
	The instructor maintained a respectful learning environment	6.8	7	7	.51	-	-	-	-	1	1	15	17	0	26
	The instructor provided feedback on my coursework that helped me improve my understanding	6.8	7	7	.55	-	-	-	-	1	2	14	17	0	26

\*N/A responses indicate that the participant felt they did not have the information or experience required to respond to a question.

<b>Faculty:</b>	Meger, Erin
<b>Question:</b>	Comments about the instructor and/or course (Responses will only be seen by the instructor)
<b>Response Rate:</b>	35.29% (6 of 17)
1	Best teacher I've had!
2	Really helpful since I hadn't had math in almost 2 years and never took calculus
3	A very nice person, a great teacher, good things all around
4	Erin is always there to help. She always says no matter what time of day, send her an email and she will try to help as best as she can
5	Despite my love of math, this is the first math class in my life that I haven't dreaded going to as I really enjoyed having you as an instructor. I appreciate everything you have done for me, as well as my peers, this semester. Even though I won't be continuing on with math, as I am doing a program change that doesn't require math courses, I feel as though I would've been extremely well prepared to do the MA100 class as a result of your excellent teaching. Thank you once again for an amazing semester!
6	I really loved being in this class and I know my math knowledge has been more solidified. I always felt like I could come to you with questions which I have struggled with in the past. I think this course was taught very well as I know my knowledge on many aspects has been clarified. The only thing I would suggest is spending more in depth time in the trig unit since the only way I was able to really finish this unit's homework was because of my knowledge from grade 12. Otherwise I really enjoyed having you as my instructor!

## 6.2 CP367 Winter 2019 Evaluations

CP367 Introduction to System Programming, Wilfrid Laurier University

These are the official university evaluations from Winter 2019. The summary of my results has been compiled by the university.

## 7 Sample Course Material

### 7.1 SC101 Final Exam Fall 2018

SC101 Essential Skills for Mathematics, Wilfrid Laurier University

The following exam was written through close collaboration between myself and the instructor of record for the other section, Katie McGarry. We both used our experience teaching high school courses and university tutorials to create the exam. This exam was written mostly by myself with some suggestions and critiques from Katie, as Katie wrote the majority of the midterm. The entire course was designed and executed by the both of us.





















## 7.2 Error Analysis Assignment for SC101 Test 1

### Test 1 Error Analysis Assignment (Optional)

Due Date: Beginning of class on Friday, October 26 (late submissions will not be accepted)

Worth: Up to 5% added to your Term Test 1 mark (the adjusted grade cannot exceed 100%)

Hand in this assignment along with your original term test.

#### Part 1: Error Analysis

For each problem that you missed on the test (i.e., each problem for which you did not receive full marks), do the following:

1. State the topic being tested (e.g., "solving linear inequalities.")
2. Write out a complete, correct solution.
3. Describe and classify error. You may use the following categories as a guide:
  - Careless error (misread question, didn't follow directions, skipped steps, minor arithmetic errors, copied number down wrong)
  - Form error (missed brackets, improper notation, too messy to read)
  - Concept error (do not understand the properties or principles required to answer the question)
  - Test-taking error (changing answer from correct answer to incorrect answer, keep writing after answered question, spending too much time on one problem, rushing through "easier" questions, leaving answers blank)
4. Discuss ways to avoid making the same mistake in the future. Some examples include:
  - Read entire question thoroughly, underlining or highlighting key words. Re-read question after finishing your answer.
  - Review answers at the end of the test.
  - Check your answers if possible.
  - Close your eyes and breathe deeply during the test.
  - Repeat a positive mantra (in your head) during the test to remain calm and confident.
  - Visit instructor's office hours or check your notes to review a concept you didn't fully understand.
  - If you're stuck during the test, try to re-write information from the test question or at least attempt a first step.

**Sample response for Part 1:**

Test question: Determine  $(-2, 2) \cup [1, 7]$ . Express your answer using **interval notation**.

Incorrect solution:  $(-2, 2) \cup [1, 7] = \{x | 1 \leq x < 2\}$

Error analysis:

1. Topic: Sets and interval notation
2. Correct solution:  $(-2, 2) \cup [1, 7] = (-2, 7]$
3. In my solution, I made several errors. First of all, I did not express my answer using interval notation (a form error). This is partly because I don't completely understand interval notation, and I also need to review the names of the different types of set notation. Also, I determined the intersection of  $(-2, 2)$  and  $[1, 7]$  instead of the union. This was a careless error. If I had taken my time, I would have known that the  $\cup$  symbol indicated union.
4. I am going to redo the homework for section 0.2 and test myself on similar questions. I will make sure to draw a number line for these types of questions in the future. On the next test, as soon as I start writing, I am going to write  $\cup = \text{union} = \text{OR}$  and  $\cap = \text{intersection} = \text{AND}$  as a reminder.

**Part 2: Analysis of Learning Strategies**

Answer the following questions:

1. Do you want to do better on Term Test 2 than you did on Term Test 1?
2. If yes, what will you do differently to make that happen? Be specific in your response.

To answer these questions, consider:

- How often do you attend class?
- How much time have you been spending on homework?
- How many extra homework problems do you do?
- Do you make study notes?
- How often do you visit the Math Assistance Centre?
- How often do you visit the instructor's office hours?
- What do you do when you are stuck on a problem?
- Have you made a free consultation appointment with a learning strategist?
- Have you made a free consultation appointment with a time management coach?
- Have you made a free consultation appointment with the Math Assistance Centre staff?
- Have you visited a counsellor at the Wellness Centre to discuss anxiety and stress levels?

### 7.3 Midterm for CP367 Winter 2019

CP367 System Programming, Wilfrid Laurier University

I have chosen to include this assessment to highlight my ability to create assessments for advanced computer science courses. I was the course coordinator and only instructor of this course in Winter 2019, and all course materials needed to be recreated due to a change in the academic calendar to this course. Initially, this course contained a significant portion of an introduction to C programming, however, that was added as an additional course prior. Thus, the old midterms that I had access to did not contain questions at an appropriate level for this course.

This midterm exam included a 50 minute 40 question online multiple choice component that was conducted in the computer lab prior to the in-class written midterm. Students had 50 minutes to complete the following questions in the booklet. These questions were distinct, but similar, to previous assignment problems and assigned textbook questions.

# CP367 System Programming - MIDTERM TEST

## February 27th, 2019

### Notes and Instructions:

- This is a closed book exam. No calculator allowed.
- Written programs are marked for clarity and syntax
- The use of pseudo-code will result in a loss of marks
- Use the provided examination booklet to answer each of the questions below.
- Write your name and student number on the cover of each booklet.
- You do not need to hand in this paper with your exam.

Mark Breakdown						
Question	1	2	3	4	Bonus	Total
Total Points	6	10	10	10	4	36

## Questions

### Question 1 - 6 marks

Using a diagram, explain the inode filesystem. Please include and describe each component.

### Question 2 - 10 marks

Write a C program that takes a file name from the command line argument (ie. `./a.out arg`) and prints the word count (`wc`) of the file. Assume the filename entered is always correct. Write a sample command line prompt for your code, and the desired output.

### Question 3 - 10 marks

Write a C program that takes a file name from the standard input and determines whether that file is in the directory using system calls to command line commands (eg. `grep`, `sed` and `ls`). Write a sample command line prompt for your code, and the desired output.

### Question 4 - 10 marks

The standard version of `cp` silently overwrites existing files. Write an additional piece of C code that will check if a file is in the directory already, and ensure that `cp` will not overwrite the file. Your version of `cp` should abort and present the user with an error message. You may refer to your code from Question 3. Assume the file names are already assigned as string variables named `file1` and `file2`. You do not need to rewrite `cp`.

### Bonus Question - Question 4 Extended - 4 bonus marks

Instead of aborting the `cp`, have your code prompt the user for a new name for the file, recheck if the name is sufficient, and then proceed to copy as usual.

## 7.4 Course Outline and Material for MTH260

MTH260 Introduction to Mathematical Inquiry, Ryerson University

This course was designed for Ryerson's Mathematics department to address the gap in coursework between first year introductory algebra and upper year pure math courses. I designed this course by examining the gaps in the knowledge of the math students through discussions with students, experience as a teaching assistant, and discussions with the chair of the department.

The course was accepted by the departmental curriculum committee without revision and has since been approved by Ryerson Senate. The course is set to be added to the mandatory mathematics curriculum for students in their second semester of first year or their first semester of second year.

I have included the final project for the course, along with its corresponding rubric.

### MTH260 Introduction to Mathematical Inquiry

This course will teach students how to properly read and analyze a proof. From generating their own proofs to evaluating the proofs of peers, students will have an in-depth opportunity to appreciate the rigour of mathematics. Elements of Analysis will be studied including absolute value and delta-epsilon limit definitions. Some concepts from number theory and geometry will be used to teach the method of proofs. Students will use interpersonal skills to present their own proofs and correct other proofs; learning the difference between the mathematically sound and the logically invalid. This course is designed to encourage the pursuit of true mathematical rigour and inquiry.

#### Course Information

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<b>Course Instructor</b>	Erin Meger
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<b>Prerequisite</b>	MTH110 Discrete Math I

#### Course Agreement

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The goal of this course is to offer a meaningful, rigorous, and rewarding experience to every student; you will build that rich experience by devoting your strongest available effort to the class.

You will be challenged and supported.

Please be prepared to take an active, patient, and generous role in your own learning and that of your classmates. (c/o Federico Ardila)

## Learning Outcomes

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- Use mathematical notation properly and effectively, and integrate definitions with techniques of proving to write proofs in a variety of math topics
- Write well-written proofs, and understand the components of proper math writing including the appropriate logical leap for an undergraduate level student
- Read, understand, and correct your own proofs and others proofs
- Create written documents and slides using LaTeX
- Understand the importance of mathematical literacy in the math community, including respecting the proof writing process and collaborating effectively
- By the end of the course students should understand and be able to write proofs and solve problems about the following topics.
  - Delta-Epsilon definition of a limit
  - Absolute Value
  - Bijections
  - Countability
  - Relations and their properties
  - Set Operations
  - Supremum and Infimum
  - Divisibility and GCD
  - Fermat’s Little Theorem
  - Euler’s Phi Function
  - Euclids Elements

## Method of Instruction

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This course is a required course for math majors in the second semester of their first year. It will be offered via one 3-hour lecture to a class capped at 50 students. Classes will be engaging, involving group work activities, small presentations, independent work, and lectures. Each class will contain a quiz to encourage participation and attendance.

In addition, students have a choice in writing either a midterm or two take home assignments. There is significant research showing that students perform better when they have a choice in their assessment methods. The emphasis on this course is on writing proofs. Students have an opportunity to make an informed choice on whether they perform better under pressure or with ample time. This is an important lesson in that the proof-writing process cannot always occur under the time constraints of an exam.

## Course Reading and Textbook

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The required textbook for this course is *Writing, Reading, and Proving: A Closer Look at Mathematics* written by Ulrich Daepf and Pamela Gorfin. This book will be referenced by its chapter numbers. We will also be using the Bartle book *Introduction to Real Analysis*; this book

will be referenced as “Bartle” in the schedule below. The sections by week are listed below along with a number of homework problems assigned from the text.

## Mark Breakdown

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### Traditional Assessments

15% Weekly Quizzes

20% Assignments OR Midterm

Students Must sign COURSE INTENTIONS FORM by WEEK 2

Choice of traditional midterm or traditional assignments

Questions concern all previous mathematics topics

Marked with heavy emphasis on notation and readability

### Group Project

2% Math Goals Reflection

Find an upper year math course or topic that interests you

Write a half page reflection detailing why it is interesting to you

6% Group Topic Resource Collection

In groups find open resources on assigned topic

Resources could include library textbooks or online videos

10% Group Topic Glossary

Use feedback from Resource Collection

Create a document of basic terms from the assigned topic

Document may include examples and illustrations to explain terms

Must include proof of assigned theorem written in own words

12% Final Group Presentation

Groups present assigned topic

Must include the proof of theorem assigned by instructor in WEEK 7

Marked as a group.

### Final Exam

35% Final Exam

150 minutes during University exam period

Date and location TBD

Focus on Material, contains small component of course reflection

## Weekly Topic Outline

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Week	Topics	Textbook
Week 1	Polya's Four Pillars Existential Quantifiers Mathematical Notation Proof Techniques Intro to LaTeX	Chapter 1 Chapter 4 Chapter 4 Tips on Quantification Chapter 5
Week 2	Absolute Value and Interval Notation Relations Sets Writing Proofs	Chapter 5 Chapter 10 Chapter 7,8,9 Chapter 9 Tips on Writing Math
Week 3	Functions Bijections Inverses Reading Math Correcting Proofs	Chapter 14 Chapter 15 Chapter 16,17 Chapter 10 Tips on Reading Math
Week 4	Countability Logical Leaps	Chapter 21-23 Chapter 13 You Solved it now what?
Week 5	MIDTERM Paradoxes	
Week 6	Delta Epsilon	Bartle 4.1
Week 7	Supremum and Infimum	Chapter 11 Bartle 2.3
Week 8	Divisibility and Parity Modular Arithmetic	Chapter 3 Chapter 27
Week 9	Fermat's Little Theorem Eulers Phi Function How to Beamer	Chapter 28 Chapter 29
Week 10	Euclids Elements Presentation Skills	Class Notes
Week 11	Euclidean Geometry	Class Notes
Week 12	Final Presentations	

## Course Policies

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**Participation Policy** As per the course agreement stated at the top of this outline, it is important that students come prepared to class. This included being ready to work with others, and having done the appropriate homework for the lesson. Each student should take active involvement in the class in order to gain the most out of each lesson and activity.

**Late Policy** Assignments will not be accepted after the due date unless arrangements are made with the instructor in advance.

**Respect Policy** The classroom is designed to be a safe space for learning and especially for making mistakes. It is of the utmost importance that each student understand and respect the learning process for their classmates. Disrespect of any kind will not be tolerated within the classroom.

**Email and Office Hours** Any student is welcome to send an email to me at anytime regarding any comment or concern in the course, and I will respond to these emails in a timely manner. I am here to guide and support your learning. If you are struggling or confused with the material please send me an email or attend weekly office hours. Remember, all correspondence must be done through your RYERSON email address, referencing the course number, and including you full name.

**Changes to Outline** The Lecturer reserves the right to modify or change any component of this course outline. Any changes will be posted on D2L prior to taking effect.

**Academic Integrity** In a course which includes a significant portion of group work, it is imperative that each student has a solid understanding of academic integrity. Any academic integrity violations will be dealt with as per university regulations. For more information you can consult the academic integrity website [www.ryerson.ca/academicintegrity](http://www.ryerson.ca/academicintegrity) and also [www.ryerson.ca/senate/policies](http://www.ryerson.ca/senate/policies). It is highly encouraged that you complete the module on the website as well.

**University Regulations** Please visit the senate website at [www.ryerson.ca/senate](http://www.ryerson.ca/senate) for more information on policies affecting undergraduate students. The following are a list of policies to consider:

- Course Management Policy 145
- Student Code of Academic Conduct Policy 60
- Student Code of Non-Academic Conduct Policy 61
- Examination Policy 135
- Policy on Grading, Promotion, and Academic Standing Policy 46
- Undergraduate Academic Consideration and Appeals Policy 134
- Accommodation of Student Religious Obligations Observance Policy 150
- Academic Accommodation of Students with Disability Policy 159

## **MTH260 Final Project**

The goal of this semester long project is to introduce students to a new area of mathematics and develop a sense of mathematical inquiry. The project begins by selecting a topic that interests you as a student, there are a number of potential topics listed at the back of this document. Students will then be placed into groups; all efforts will be made to assign groups and topics in line with the reflections submitted. The group will develop a write up and presentation that could be presented to other undergraduate students, for instance at the Canadian Undergraduate Mathematics Conference.

The RUBRIC for each component can be found in a separate document.

### **Math Goals Reflection - Week 3**

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Write a 300-500 word reflection on a math topic that interests you. The reflection will be marked only on content and not on presentation or spelling and grammar. You should find some resources that helped you understand why the topic was interesting and detail these resources in the reflection.

### **Group Topic Resource Collection - Week 6**

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After the reflections have been assigned and marked, you will be placed into groups of 4 or 5 students. In these groups you will need to research the topic and create a glossary of terms, and compile some resources that discuss the topic. For each resource outline in one to two sentences how the resource could be useful in your final presentation.

## Group Topic Write Up - Week 10

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The write up will build on the resource collection, and will include a section on motivation and all relevant definitions. A theorem from the subject area will be assigned by the instructor to each group after the submission of the resource collection.

## Group Presentation - Week 12

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The final day of the course will have each group presenting their final project to the class. The presentation must be made on slides using LaTeX. In class, we will discuss effective presentation skill, and students should implement these techniques into their presentations. These presentations should be fun and captivating to the class. Please note the rubric goes across two pages.

## Potential Topics

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Below is a list of potential topics. Students can use these topics as a guide, and may choose topics outside of the list. The topics in the list are at an appropriate level for students and have a number of resources available.

- Graph Coloring
- Similar Triangles
- Geometric Constructions
- Cops and Robbers
- Bolzano-Weierstrauss Theorem
- Chinese Remainder Theorem
- Lewis Carol Determinants
- Vector Spaces
- RSA Code
- Rational and Irrational Numbers

## MTH260 Final Project RUBRIC

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### Math Goals Reflection - Week 3

	Excellent	Good	Satisfactory	Unsatisfactory
<b>Topic</b>	strong mathematical relevance	some mathematical relevance	not relevant but similar topics could relate	no mathematical relevance
<b>Resources</b>	clearly details how topic was found, sources are included and described, and students particular interest in the topic should be discussed	included why the topic is interesting and has some resources but lacks clarity on why the sources are helpful	some details on student interest are included and little to no sources are used	no sources are used and there is no clarity on why the topic is interesting

**Group Topic Resource Collection - Week 6**

	Excellent	Good	Satisfactory	Unsatisfactory
<b>Definitions</b>	all relevant definitions are included and properly defined	most relevant definitions are included and most are properly defined	many definitions are included but only some are well defined	definitions are not relevant and/or are poorly defined
<b>Resources</b>	each resource has one to two sentences that clearly indicate its usefulness	resources have one to two sentences that have some indication of its usefulness	some resources have one sentence about its usefulness	resources do not have any sentences detailing any usefulness
<b>LaTeX</b>	LaTeX Used			LaTeX Not Used

### Group Topic Write Up - Week 10

	Excellent	Good	Satisfactory	Unsatisfactory
<b>Motivation</b>	Introduction and motivation are included, written captivatingly, and highly detailed,	introduction and some motivation are included that contain some detail	introduction provides no motivation but introduces the topic	introduction not included
<b>Definitions</b>	all relevant definitions are included and properly defined	most relevant definitions are included and most are properly defined	many definitions are included but only some are well defined	definitions are not relevant and/or are poorly defined
<b>Theorem</b>	All details of the theorem are included, written in proper mathematics notation, and clearly written in the students own words	most details of the proof are included, mathematical notation is utilized effectively, but some details are copied from original text	some details are committed and notation is not used consistently, some details are copied	major logical leaps are made, notation is never used correctly, and many details are copied directly
<b>LaTeX</b>	LaTeX Used			LaTeX Not Used

**Group Presentation - Week 12**

	Excellent	Good	Satisfactory	Unsatisfactory
<b>Presentation</b>	Speakers engage the audience and use presentation skills effectively	Speakers are clear and concise and use some presentation skills effectively	Presentation skills are used somewhat effectively, speakers are not clear	Speakers are not clear and not engaging, presentation skills not effective
<b>Definitions</b>	all relevant definitions are included and properly defined	most relevant definitions are included and most are properly defined	many definitions are included but only some are well defined	definitions are not relevant and/or are poorly defined
<b>Motivation</b>	Introduction and motivation are included, written captivantly, and highly detailed,	introduction and some motivation are included that contain some detail	introduction provides no motivation but introduces the topic	introduction not included
<b>Theorem</b>	All details of the theorem included, written in proper notation, and written in the students own words	most details of the proof are included, mathematical notation is used effectively, some details are copied	some details are committed and notation is not used consistently, some details are copied	major logical leaps are made, notation is never used correctly, and many details are copied directly
<b>LaTeX</b>	LaTeX Used			LaTeX Not Used