TEACHING PORTFOLIO

MARYAM KHAQAN

The purpose of this document is to provide evidence for my efficacy as an instructor. To achieve this goal, I have included a list of courses that I have taught at Emory University, along with examples of unique course materials that I have developed and students' responses to my teaching. Here I give a brief description of the material included in this document.

1. Teaching Experience

Following is a list of courses I have taught as an instructor of record. These are positions where I was responsible for all course preparation, including writing the syllabus, lecturing in class, and writing the exams. This information is also available on my CV.

- Linear Algebra (Math 221) *Spring 2021
- Calculus II (Math 112), Spring 2020
- Calculus II (Math 112), Fall 2019
- Calculus I (Math 111), Spring 2019
- Calculus I (Math 111), Fall 2018
- Calculus II (Math 112), Spring 2018
- Calculus I (Math 111), Fall 2017

*Currently scheduled as of Fall 2020.

2. Statement of Teaching Philosophy

> "The lecturer should lay [their] hands on the plough, the loom, the forge, the workshop, the mine, the sea, the stars, all things on earth or under heaven, which may help to arouse the attention or interest the imagination of [their] auditors."– J. J. Sylvester.

As a graduate student at Emory University, I have taught six semesters of Calculus 1 and 2, along with serving as an instructor for the Emory Math Circle, a weekend enrichment program for middle school and high school students. In March 2020, I had to move my Calculus 2 class online, and in the summer, I was selected to lead a cohort of 30-plus math instructors through a three-week training program in online course design and digital pedagogy. No matter the classroom setting, my main goal in teaching is the same: I want to foster a supportive, inclusive, and engaging environment where students can develop their natural curiosity, take ownership of their learning, and feel confident in their ability to learn and share mathematics.

To **foster an engaging and inclusive environment,** I encourage participation from all students and use group work to allow them to participate in a less threatening setting. In lectures, I frequently pause to ask and answer questions. To promote engagement from all students, including those who are hesitant, I use a two-tier hand-raising system. Students raise their hands if they think they know the answer to my question, regardless of whether they are willing to share it with the class. If most students raise their hands, I acknowledge them and ask them to keep their hands raised if they would like to share their answers. If I only see a couple of hands raised in the first round, I announce that I am still waiting for more people to respond. If I still see too few hands raised, I stop and explain again. This method avoids the need to cold-call students while also making sure it is not always the same few students who get to participate. In an institution with larger class sizes, I would use technology to achieve the same goal.

I use informal assessments in addition to quizzes and exams throughout the semester to adjust my class's pace. In Fall 2019, as part of my **Advanced Graduate Teaching**

Fellowship, I completed the Center for the Integration of Research Teaching and Learning (CIRTL) Network's online course, *An Introduction to Evidence-Based Undergraduate STEM Teaching*. This course introduced me to several effective teaching strategies and made me more inclined to incorporate active learning in my classroom. For example, one of the modules of this course focused on "activating prior knowledge" in students, which motivated me to start new topics with a warm-up problem. Currently, I use "Index Card Problems," a similar technique where I ask students to answer a question or share an idea on an index card during class and hand it in. I then quickly go through the index cards to get a sense of how comfortable they feel with the content I have just covered. I can revisit the material or move on based on this feedback. This approach lets students communicate their difficulties and thought processes without the pressure of sharing with the entire class.

To encourage students to **be curious and take ownership of their learning,** I use both index card problems and worksheets to set up topics before I teach them. For example, I teach numerical integration as a group activity. Each group uses rectangles and trapezoids to approximate the area under the curve for different data sets and then compare and analyze their findings. When teaching the Alternating Series Convergence Theorem, I ask students to solve several examples of convergent and divergent alternating series "by hand" to try to predict the theorem's statement before I teach it.

Most mathematicians I know were drawn to math because they were curious and that curiosity was rewarded. This reward could be abstract (e.g., a feeling of accomplishment, discovering the beauty of mathematics) or more concrete (winning a math competition, getting a good grade). As part of my Advanced Graduate Student Teaching Fellowship, I conducted a **Teaching-as-Research (TAR) Project** measuring the role of curiosity in student engagement and performance, and found favorable results. These observations have led me to cultivate curiosity and a sense of discovery in my classes. I help students feel like they are discovering parts of the content on their own, often by breaking problems down to short, focused questions that lead them to the correct answer.

Learning how to approach problems is an integral part of mathematics education, but **effectively communicating mathematics** is equally important. I compare it to learning to appreciate poetry in a language that is not your first. For this reason, I emphasize learning mathematical vocabulary early and well. In a Calculus class, when students first see a theorem and discover its various components (hypothesis, conclusion, etc.), I encourage them to be mindful of the language. For example, the Intermediate Value Theorem states that "A continuous function f on a closed interval $[a, b]$ takes on every value between $f(a)$ and $f(b)$." One of my favorite exercises is to ask students to find scenarios where this theorem does *not* apply. For example, can they think of a discontinuous function that does not fall under this theorem?

Another one of my favorite questions is, "What does the intermediate value theorem tell you about the function $f(x) = \frac{1}{(x-3)}$ on the interval $[2, 5]$?" The correct answer is: nothing! This may feel like a trick question at first, but it instills the idea that a theorem in mathematics says *precisely* what it means. There is no subtext. A well-formed mathematical argument should be the same way; it should not have any room for loopholes. I incorporate writing questions into low-stakes assessments (weekly quizzes, index card problems, etc.) throughout the semester, and I make an effort to provide detailed feedback on their work. For example, in a quiz on the convergence of sequences, I might ask, "Argue in your own words why the Monotone Convergence Theorem should be true. Feel free to support your answer with a diagram."[1]

While mathematical writing is a vital skill, it has not always been easy to incorporate it into an intro-level math class. In Spring 2020, I implemented daily assessments where students had to submit a 3-4 line summary of what they learned in class. This both gave students practice explaining mathematics in writing and helped me track engagement when we had to move online in the middle of the semester. In their course evaluations, students said that they felt overwhelmed by daily assignments, so I will only assign summary exercises at the end of each topic when I teach Linear Algebra in Spring 2021. I will also make them due weekly instead of daily and plan to grade them for completion rather than for content.

My teaching philosophy is largely informed by my experience teaching undergraduate courses at Emory. At the same time, my nontraditional teaching experiences have helped shape who I am as an instructor. My time at Math Circle, for example, allowed me to design lessons that are not constrained by a textbook or traditional assessment techniques. I gained experience teaching students with vastly different mathematical backgrounds and incorporating "low-floor/high-ceiling" activities that allow every student to engage at their own level. As part of my Emory College Online Teaching fellowship, I led a group of more than 30 math instructors, including both graduate students, and visiting and permanent faculty, through a three-week training program focused on developing intentionally designed courses for an online fall semester. Along with being a valuable leadership and management experience, the fellowship taught me how to engage learners in an online environment and how to initiate and facilitate productive and focused discussions.

I look forward to applying my experience and training to the Linear Algebra course at Emory in the Spring and to other institutions in the future.

[1] See here for selected student responses to this question.

M112 - 3 – Calculus II

Fall 2019

Instructor:	Maryam Khaqan	**Time:**	MW 4:00 – 5:15 pm
Email:	mkhaqan@emory.edu	**Place:**	W303

Office Hours: *Mondays 11:30 am to 1:30 pm, Tuesdays 2:30 pm to 3:30 pm.* Office Hours are always held in **MSC W431.**

Text Book: Calculus, 8th Edition, Single Variable Calculus, Early Transcendentals - James Stewart.

Coarse Goal: Following sections from the text will be covered:

§7.1 - 7.4, 7.7, 7.8, 11.1 - 11.11, 8.1, 8.2, 9.1 - 9.5, 10.1 - 10.4

Exam Dates:

- The midterm exams are tentatively scheduled for **September 30th, October 30th** and **November 25th, 2019.** These dates are not final and are subject to change. Any change will be announced in class at least a week before the new exam date.*
- The final exam for this course will be held on **Tuesday, December 17th, 2019** from **11:30 am - 2:00 pm.** This time cannot be changed for any reason, except in the case that a student has 3 exams in the same calendar day. (Please contact OUE as soon as possible if that's the case for you.)

Grading Scheme:

- 3 Midterm Exams: 45%
- Cumulative Final Exam: 30%
- Assignments (Quizzes/Worksheets/Problem Sets) 25%

Policies

- **Exams:** Unexcused absence from an exam will be treated as zero. If you know in advance that you will have to miss an exam due to illness or a university-sanctioned off-campus commitment, **you must contact me well before the exam**. A note from OUE (Office of Undergraduate Education) is required in almost all cases. Excuses such as travel for other reasons, non-Emory exams, etc., are not valid reasons for missing exams.
- **Homework:** Practice problems will be assigned every week, these are neither collected nor graded, but working through these is the best way to learn the material. Collaboration is highly encouraged, but it is up to each student to ensure they understand and can apply the concepts taught to solve the problems. Occasionally through the semester I will assign graded homework/take-home quizzes. No collaboration is allowed on these graded components of the course.

page 1 of 4

- **Quizzes:** Every Monday (except during breaks or exam weeks) a quiz will be given based on the practice problems of the week. Quizzes will be given during the first 10-15 minutes of class and will consist of 2-3 problems.
- **Exit Tickets:** Most days I will ask you to complete an "exit ticket" at the end of class. I may ask you to answer a short question, to predict a result, to ask me a question, etc. These exit tickets should be written on 3×5 notecards and handed in as you leave the classroom. **Please keep a small supply of notecards with you when you come to class**. Do not plan to turn in your exit tickets on scraps of notebook paper. These are graded for completion, and the sum of all exit tickets in a semester counts for one quiz grade.
- The quizzes and tests in this course are designed specifically so that no calculator is necessary. Therefore **no calculators of any kind will be permitted on quizzes or exams**. In all cases, your work must be fully explained in order to receive full credit.
- **Grade disputes:** The grade you receive is solely representative of the body of work that you have submitted over the course of the semester. It is not a grade of you, the individual, nor is it a grade of your effort. That being said, if you think you've been graded unfairly on a test (quiz or exam), you are welcome to dispute it in office hours or over email (send me a scanned copy of your test and clearly explain which questions you want rechecked) **up until a week** after the graded test is handed back. No grade disputes will be entertained after that deadline. Please keep in mind that rechecking could potentially result in lowering your score.
- **Attendance**: Attendance is not mandatory, but if you miss a class, you are responsible for making sure that you know what material was covered and if any announcements were made during class.
- Disruptions that interfere with other students' ability to learn will not be tolerated. A student may be asked to leave the class or exam for disruptive behavior. **Turn off all cell phones before class.**

Strategies for Success

Here are some suggestions for steps you can take to ensure you do well in the course:

- Attend each class, pay attention and minimize distractions.
- Don't be afraid to ask questions in class. As long as you're not disruptive, feel free to ask a question at any point during the lecture.
- Take "active notes" i.e. make sure you understand everything you're writing down instead of mindlessly copying everything on the board.
- Review notes taken in class later the same day or the next day at the latest.
- Read the textbook. After we've covered each section in class, make sure you're able to summarize the key concepts of that section to yourself or another student.
- Keep up with the homework. Solve the problems soon after they are assigned and not all at once the night before exam.
- Find a study buddy. Take turns explaining key concepts to each other. If you don't know anyone in the class but would like to work in a group, email me and I will put all those interested in touch with each other.

 page 2 of 4

- Communicate effectively and early. If you are having a hard time in the course, email me or come talk to me in office hours earlier rather than later.

Resources

- **EPASS**

  One-on-one tutoring by undergrads who have successfully taken Calculus is available for free by signing up ahead of time on the EPASS website.

- **Academic Accomodations**

  The Department of Mathematics at Emory supports equal access for students with disabilities. Any students needing special accommodations due to a disability should speak with someone in the Office of Accessibility Services and arrangements will be made. Please also contact me to discuss the accommodations before they are needed.

- **Health**

  – **Emory HelpLine** For non-urgent mental health situations, you may contact the Emory HelpLine at 404-727-4357 (HELP). The HelpLine is an anonymous, peer-counseling telephone service that is open from 8:30 PM-1:00 AM, 7 days per week during the regular academic year.

  – **Mental Health** To seek advice for emergent mental health issue or concern, call the Student Counseling Center at 404-727-7450.

  – **Student Health Services** Emory Student Health provides a variety of services including primary outpatient care, physical examinations, nutrition and substance abuse counseling and more.

Honor Code

All students must adhere to the provisions of the Honor Code. See the following:

http://catalog.college.emory.edu/academic/policies-regulations/honor-code.html

All suspected violations of the honor code will be reported to the honor council.

*This document was last updated: July 12, 2020. For the latest version, check the course page on Canvas.

The information in this document is subject to change at any point during the semester. Any changes will be communicated to the students both in class and via email in a timely fashion.

 page 3 of 4

Practice Problems

This is a list of suggested problems from each section of the book. These are neither collected nor graded. The "due date" in front of each section is really a suggestion, it may or may not coincide with the date of the quiz, though I will try my best that it does. *All information on this page is tentative (and incomplete), I will make several changes throughout the semester, as need arises. All changes will be communicated through Canvas.*

Homework	Due Date
§1.4 p. 53: 1-4, 11-16, 19-22, 24;**Appendix D,** p. A32: 1, 2, 4, 5, 7, 8, 10,17-20, 23-28, 77-82. **§1.5** p. 66: 9-12, 15-18, 21-26, 35-41, 51-56, 63-68; **§5.5** p.418: 1-36, 38-48, 53-63.	Wednesday, September 4th, 2019
§7.1 p. 477: 3-9, 13, 15, 17, 18, 23, 24, 26, 28, 29, 33, 34;	Monday, September 9th, 2019
§7.2 p. 484: 1-12, 21-30, 41-43; **§7.3** p. 491: 1-30;	Monday, September 16th, 2019
§7.4 p. 501: 1-4, 7-24, 39-42. **§7.7** p. 524: 1, 2, 7-12, 19, 20, 31	Monday, September 24th, 2019
§7.8 p. 534: 1, 2, 5-14, 27-34, 49-54; **§11.1** p. 704: 1-39, 53, 55, 72-78, 81, 82.	**Monday, September 30th, 2019**
§11.2 p. 715: 1-37, 57-63; **§11.3** p. 725: 1-21, 27-29	Monday, October 7th, 2019
§11.4 p. 731: 1-32, 38, 39 **§11.5** p. 736: 1-17, 23-28, 31	Wednesday, October 16th, 2019
§11.6 p. 742: 1-14, 17-24, 35; **§11.7** p. 746: 1-22,28, 31, 32.	Monday, October 21st, 2019.
§11.8 p. 751: 1-27, 29, 30; **§11.9** p. 757: 1-9, 13, 15-19, 25-28.	**Wednesday, October 30th, 2019.**
§11.10 p. 771: 5-9, 13-20, 29-34; **§8.1** p. 548: 7-13, 32, 33; **§8.2** p. 555: 5-10, 13-16.	Monday, November 11th, 2019
§9.1 p. 590: 1-5, 7, 9-13; **§9.3** p. 605: 1-5, 11-14, 19, 20, 43-48; **§9.4** p. 617: 1-11, 17, 19.	Monday, November 18th, 2019
§9.5 p. 625: 1-9, 15-18; **§9.2** p. 597: 1-14, 19-21;	**Monday, November 25th, 2019**
§10.3 p. 666: 1-29, 33-37, 54, 55-60. **§10.4** p. 672: 1-12, 17-20, 23-32.	Wednesday December 4th, 2019.

*The dates in bold are tentative midterm dates.

 page 4 of 4

4. Examples of Index Card Problems.

"Index Card Problems" is a technique where I ask students to answer a short question or share an idea on an index card during class and hand it in. I then quickly go through the index cards to get a sense of how comfortable they feel with the content I have just covered. The idea is similar to an "exit ticket," except I use them at any time during a class session, not necessarily at the end. Here I give a few examples of index card problems I have used in the past:

- Example 1: Trigonometric Integrals.
  When transitioning between teaching integration by parts to computing integrals of powers of common trigonometric functions using trig identities, I start the class with the following Index Card Problem:
  Compute
  $$\int \sin^2(x)\,dx$$
  using one of the integration techniques we have learned so far.
  Since this topic comes right after they have learned integration by parts, most students try that and realize that it doesn't work for this integral. This sets up the need to learn trig identities.
- Example 2: Trigonometric Substitution.
  When teaching students how to integrate a function of the form
  $$\int \sqrt{a^2 \pm x^2}\,dx$$
  I begin class by asking them to: *Consider the circle defined by* $x^2 + y^2 = 9$. *Express the area of this circle as an integral.*
- Example 3: Limits at Infinity.
  After introducing students to the idea of a horizontal asymptote, I ask them to: *Sketch the graph of a function that has two different horizontal asymptotes.*
- Example 4: Improper Integrals.
  I begin the section on Improper Integrals by asking students to:
  Consider the integral $A(t) = \int_1^t \frac{1}{x}\,dx$ *for* $t = 1, 2, 3, 4, 5$. *Draw a picture that represents* $A(t)$ *as an area under some curve.*
- Example 5: Alternating Series Convergence Theorem.
  I include here the first few pages of my lecture notes for the Alternating Series Convergence theorem, to demonstrate how I use index card in the middle of a class session (instead of at the beginning or end.)

§ SECTION 11.5: ALTERNATING SERIES

Most convergence tests that we've dealt with so far require a series with all positive terms. (e.g. Comparison test, limit comparison test, integral test, etc).

We are now going to add new tools to our toolbox by considering series with some negative terms:

> An alternating series is one whose terms are alternately positive & negative.

For example:

1. $\frac{1}{2}-\frac{1}{4}+\frac{1}{8}-\frac{1}{16}+\frac{1}{32}-\frac{1}{64}+\cdots = \sum_{n=1}^{\infty}(-1)^{n-1}\frac{1}{2^n}$.
2. $1-1+1-1+1-1+\cdots = \sum_{n=1}^{\infty}(-1)^{n-1}$
3. $-1+\frac{1}{2}-\frac{1}{3}+\frac{1}{4}-\frac{1}{5}+\frac{1}{6}-\cdots = \sum_{n=1}^{\infty}\frac{(-1)^n}{n}$

Non-example:

1. $\sum_{n=1}^{\infty}\frac{\cos(n)}{n^2}$ is a series with negative & positive terms but it is not alternating.

Note: • The n^{th} term of an alternating series is of the form

$$\boxed{a_n = (-1)^n b_n} \quad \text{or} \quad \boxed{a_n = (-1)^{n-1} b_n}$$

where $b_n > 0$.

Question: Which of the examples above converges?

1. let's consider $\sum_{n=1}^{\infty}\frac{(-1)^{n-1}}{2^n}$ & compute a few partial sums:

$$S_1 = \frac{1}{2}$$

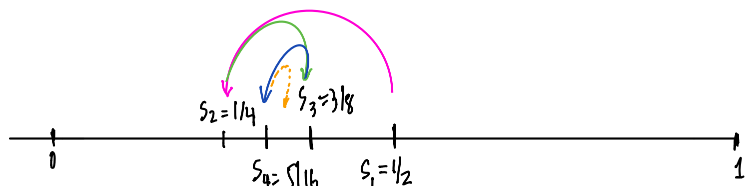
$$S_2 = \frac{1}{2}-\frac{1}{4} = \frac{2-1}{4} = \frac{1}{4}.$$

$$S_3 = \frac{1}{4}+\frac{1}{8} = \frac{2}{8}+\frac{1}{8} = \frac{3}{8}$$

$$S_4 = \frac{3}{8}-\frac{1}{16} = \frac{6}{16}-\frac{1}{16} = \frac{5}{16}$$

$$S_5 = \frac{5}{16}+\frac{1}{32} = 11/32$$

let's plot these on a number line.



does this seem to be converging?

Yes, to some number between s_3 & s_4, in fact.

---

(2) What about $\sum_{n=0}^{\infty} (-1)^{n-1} = 1-1+1-1+1-1 \ldots$

The partial sums are $\{1, 0, 1, 0, \ldots\}$ and

$\lim_{n\to\infty} s_n$ does not exist (it oscillates between 0 & 1)

---

(3) Index Card problem:

Repeat the same process as example 1 for

$$\sum_{n=1}^{\infty} \frac{(-1)^n n}{n+1} = \frac{-1}{2} + \frac{2}{3} - \frac{3}{4} + \frac{4}{5} - \frac{5}{6} + \cdots$$

(Compute a few partial sums & plot them on a number line. Decide if the series converges or diverges)

Solution: $s_1 = -1/2$

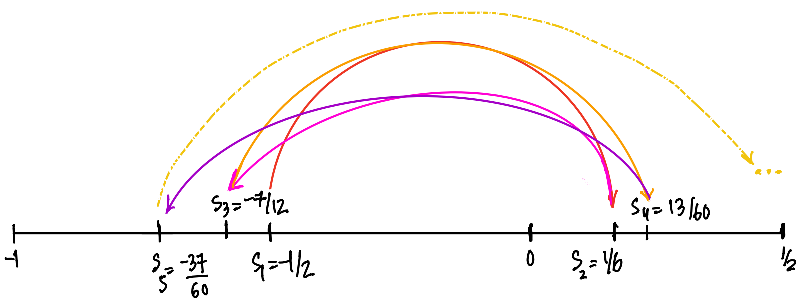
$$s_2 = \frac{2}{3} - \frac{1}{2} = \frac{4-3}{6} = 1/6.$$

$$s_3 = 1/6 - \frac{3}{4} = \frac{-7}{12}$$

$$s_4 = \frac{13}{60} = \frac{2.6}{12}$$

$$s_5 = -37/60$$

$\vdots$



This does not seem like it converges.

Why? What is different about $\sum_{n=1}^{\infty} \frac{(-1)^n n}{n+1}$ as compared to $\sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^n$?

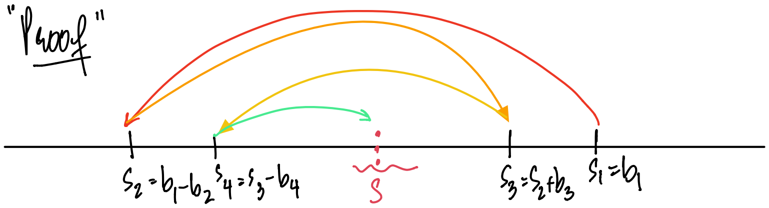
Can you think of another reason why

$$\sum_{n=1}^{\infty} \frac{(-1)^n\, n}{n+1}$$ diverges? Hint: think about $$\sum_{n=1}^{\infty} \frac{n}{n+1}$$ first.

ALTERNATING SERIES TEST

Let $\sum_{n=1}^{\infty} (-1)^n b_n = b_1 - b_2 + b_3 - b_4 + \ldots$ be an alternating series. If $\lim_{n\to\infty} b_n = 0$ and $\{b_n\}$ is an eventually decreasing sequence. Then $\sum_{n=1}^{\infty} (-1)^n b_n$ converges.

"Proof"



Examples

1. $$\sum_{n=1}^{\infty} \frac{(-1)^n\, 3n}{4n-1}$$

This is an alternating series w/ $b_n = \frac{3n}{4n-1}$.

Since $\lim_{n\to\infty} b_n \neq 0$, the alternating series test DOES NOT APPLY!

The series diverges by test for divergence.

2. Try on your own:

$$\sum_{n=1}^{\infty} \frac{(-1)^n\, n^2}{n^3+1}.$$

This is an alternating series with $b_n = \frac{n^2}{n^3+1}$.

Since $\lim_{n\to\infty} \frac{n^2}{n^3+1} = \lim_{n\to\infty} \frac{1/n}{1+1/n^3} = 0$;

we check whether b_n is decreas..

Let $f(x) = \frac{x^2}{x^3+1}$. Then, $f'(x) = \frac{x(2-x^3)}{(x^3+1)^2}$ & $f(n) = b_n$. Since $f'(x) \leq 0$ when $x \geq \sqrt[3]{2}$, this means that $\{b_n\}$ is eventually decreasing.

Thus the alternating series test applies and hence

$$\sum_{n=1}^{\infty} \frac{(-1)^n\, n^2}{n^3+1}$$ converges.

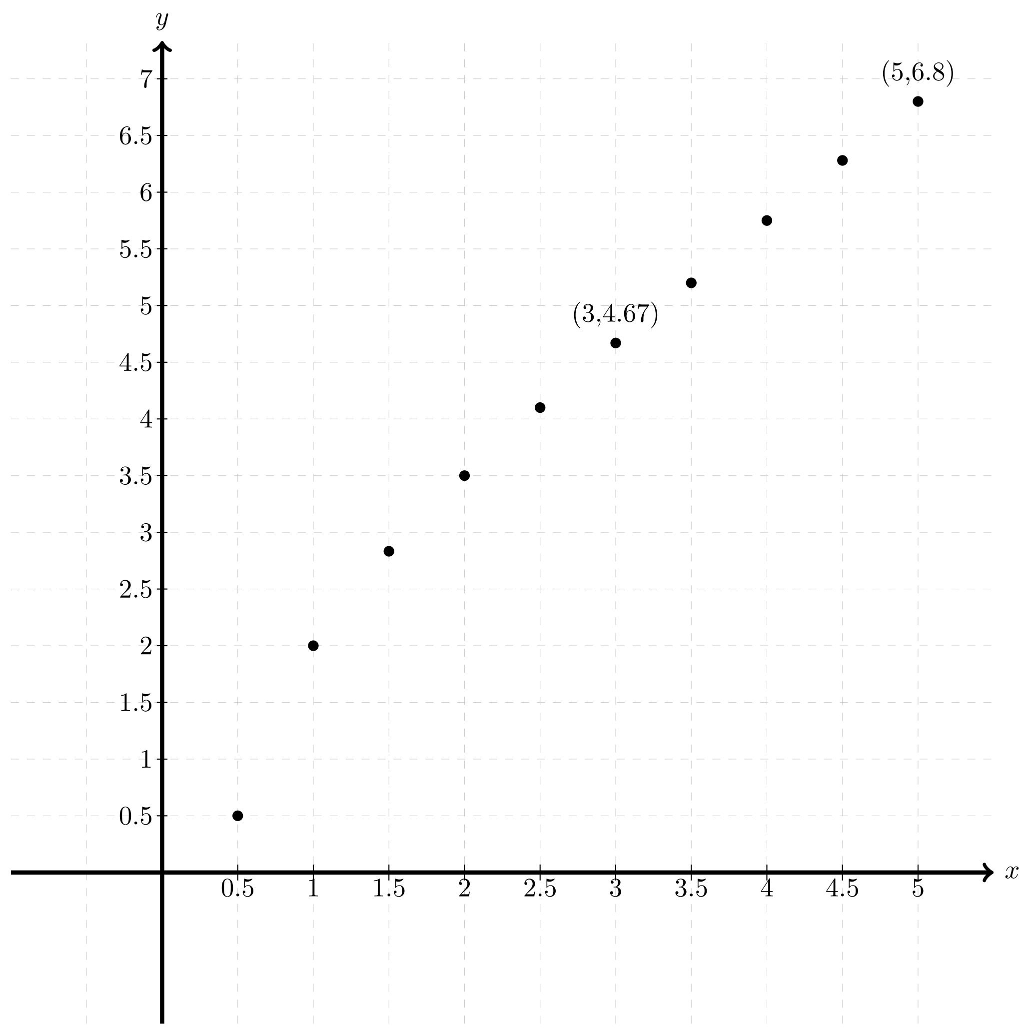
. M112 - 3 – Fall 2019 – Maryam Khaqan

Approximate Integration

A radar gun is used to measure the speed of a certain runner during the first five seconds of a race. The data is given in the following table.

t(seconds)	v(meters per second)	t(seconds)	v(meters per second)
0.5	0.5	3	4.67
1	2	3.5	5.2
1.5	2.8	4	5.75
2	3.5	4.5	6.28
2.5	4.1	5	6.8

Your job is to approximate the distance travelled by the runner in the between the times $t = 0.5$ second and $t = 4.5$ seconds. Here's a plot of the data. The x-axis is time, measured in seconds. The y-axis is speed, measured in meters per second.



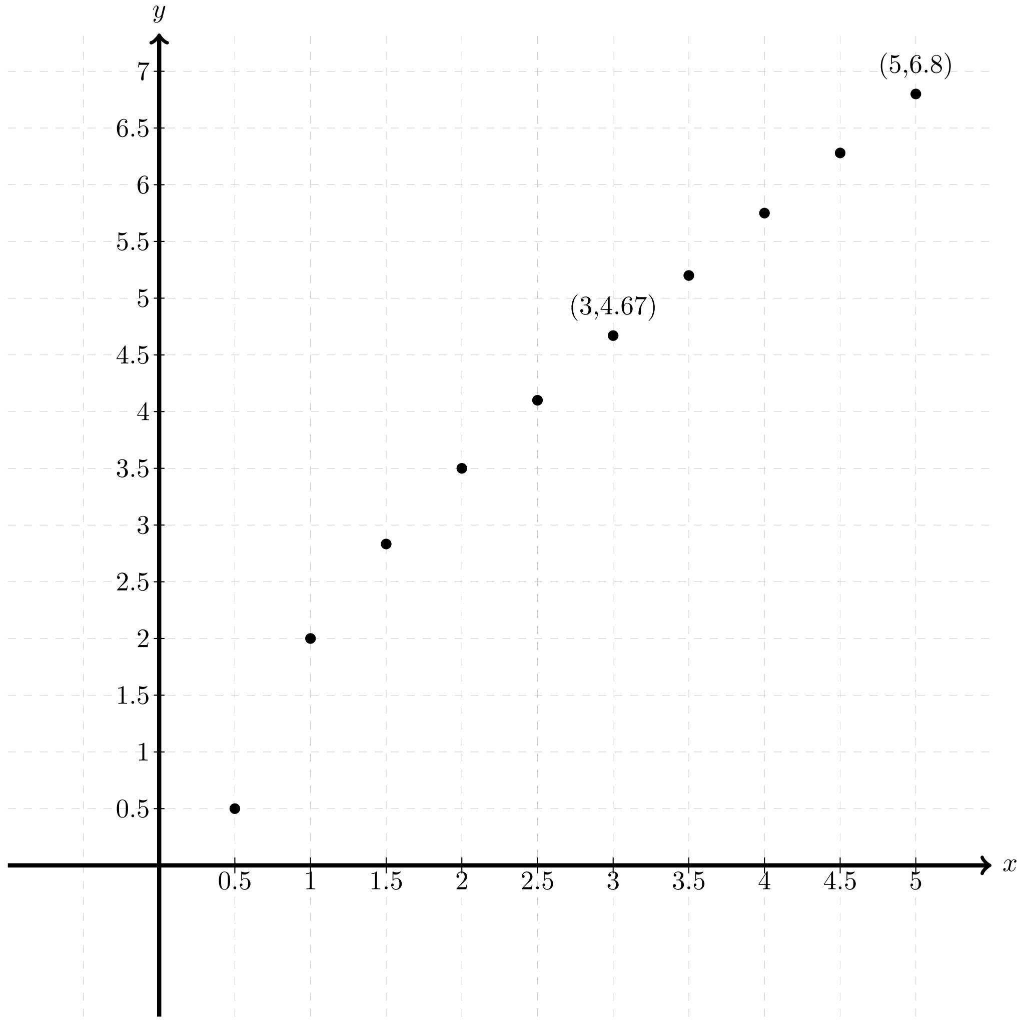
1. On the above plot, divide the interval between $x = 0.5$ and $x = 4.5$ into 4 equal subintervals. Then, on each subinterval, draw a rectangle whose top **right endpoint** lies on one of the data points plotted on the graph.

(a) Compute the total area of the 4 rectangles.

(b) The area you computed in part (a) approximates the area under a certain curve. What physical quantity does the area being approximated represent?

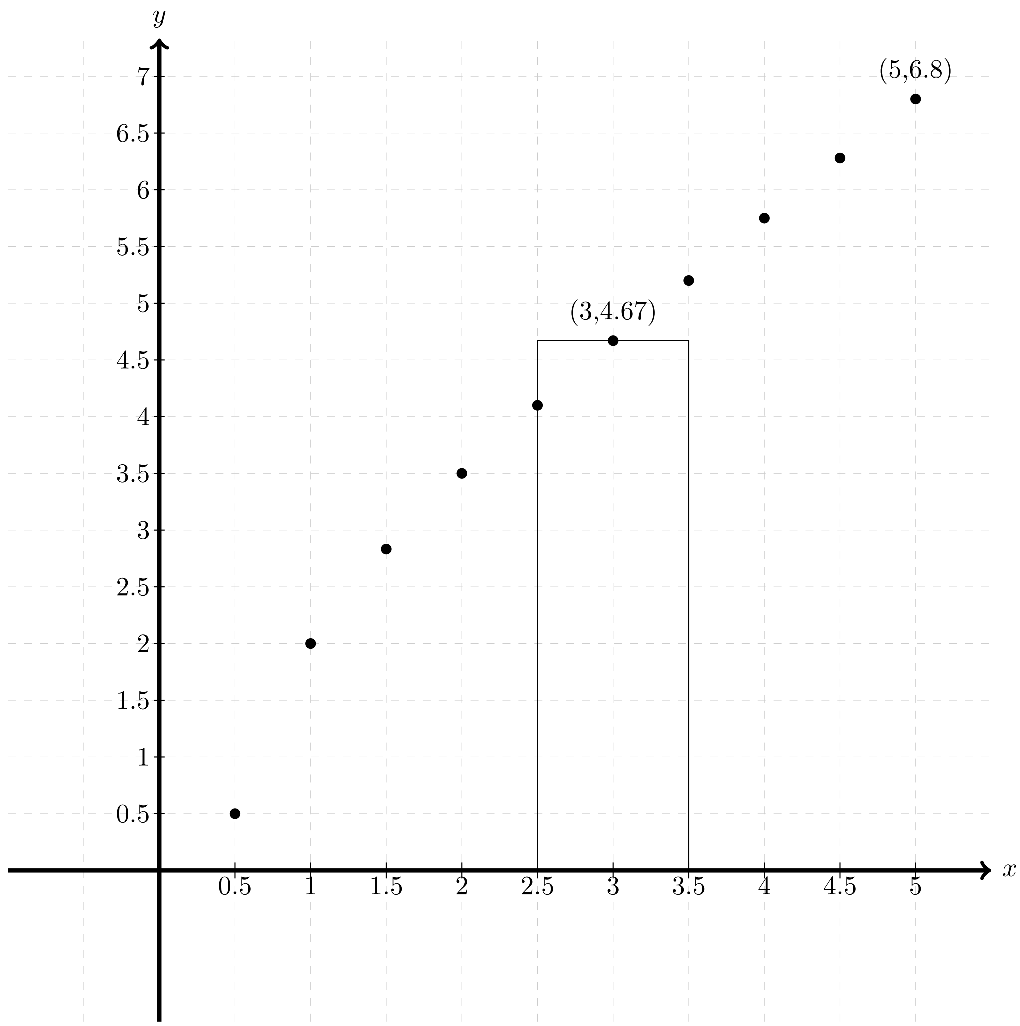
(c) Is this an overestimate or an underestimate? If it's an overestimate, can you think of ways of getting an underestimate, and vice versa? Talk to group mates and come up with at least two different ways you could get an underestimate.

2. Repeat the above process using 8 rectangles instead.



Is this a better or worse approximation (compared to Question 2) of the actual area under the curve? Explain why you think this is better or worse. Do your groupmates agree with you?

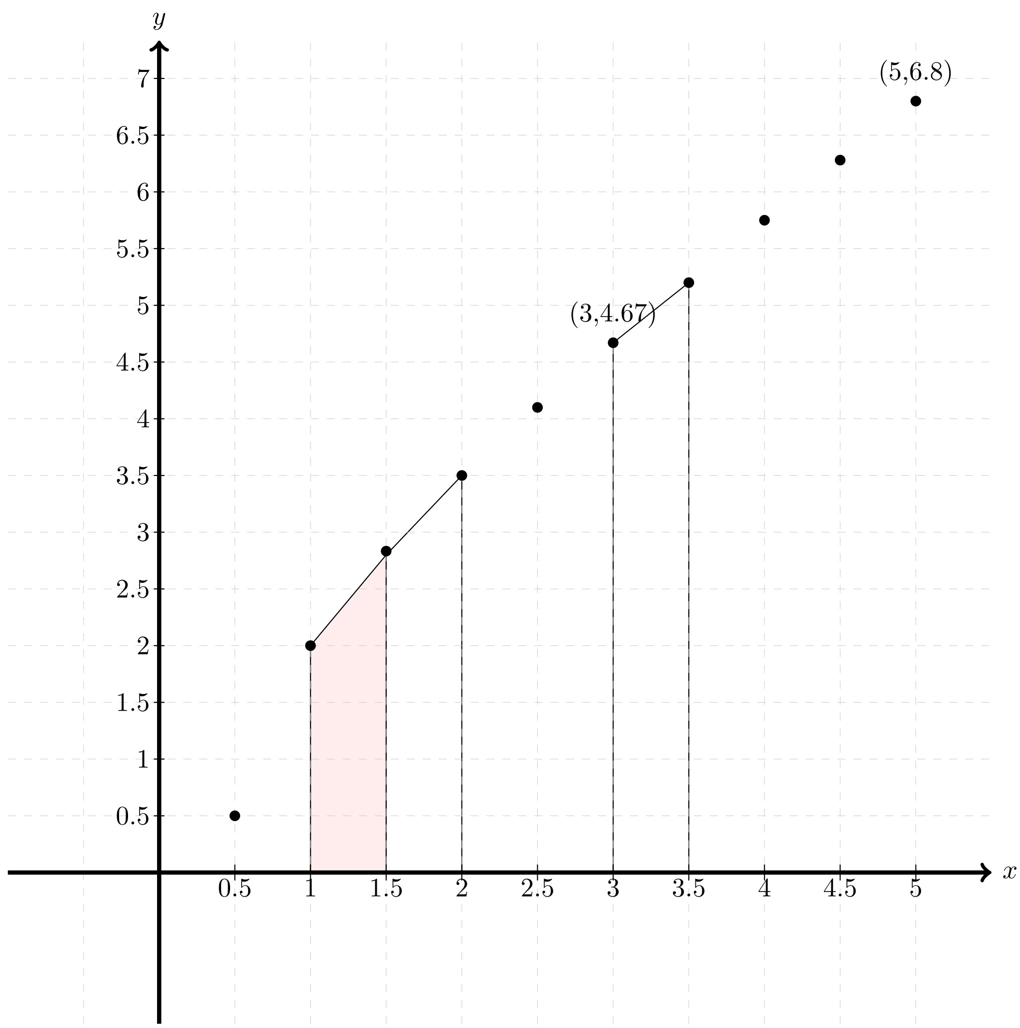
3. Here's the plot from the first page again. This time draw 4 rectangles such that the plotted data points (between $x = 0.5$ and $x = 4.5$) are **midpoints** of the top of the rectangles. One example is drawn for you.



Calculate the total area of these rectangles. Which of the 3 answers you've gotten (right endpoints w/ 4 rectangles, right endpoints w/ 8 rectangles, midpoints with 4 rectangles) do you think approximates the distance best?

Can you repeat this exercise with 8 such rectangles? Explain.

4. Here's the same plot again. This time, instead of drawing rectangles, draw 8 **trapezoids.** A couple of these are already drawn for you, continue the pattern until you use up all data points.



Recall that the area of a trapezoid is width*(average of heights), for example, for the first trapezoid in the plot above (shaded in), the area is given by

$$0.5 * \frac{2 + 2.8}{2} = 1.2.$$

Calculate the total area of the trapezoids.

(To be turned in as a group)

Based on your findings, arrange the following quantities in ascending order.

(I) The integral $\int_{0.5}^{4.5} f(x)\,dx$.

(L4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***left endpoints*** of $n = 4$ rectangles.

(R4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***right endpoints*** of $n = 4$ rectangles.

(M4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***midpoints*** of $n = 4$ rectangles.

(T4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using of $n = 4$ ***trapezoids***.

$$\boxed{} \leq \boxed{} \leq \boxed{} \leq \boxed{} \leq \boxed{}$$

Which of the following quantities gives the best approximation for the integral

$$\textit{(I)} = \int_{0.5}^{4.5} f(x)\,dx.$$

(L4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***left endpoints*** of $n = 4$ rectangles.

(R4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***right endpoints*** of $n = 4$ rectangles.

(M4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***midpoints*** of $n = 4$ rectangles.

(T4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using of $n = 4$ ***trapezoids***.

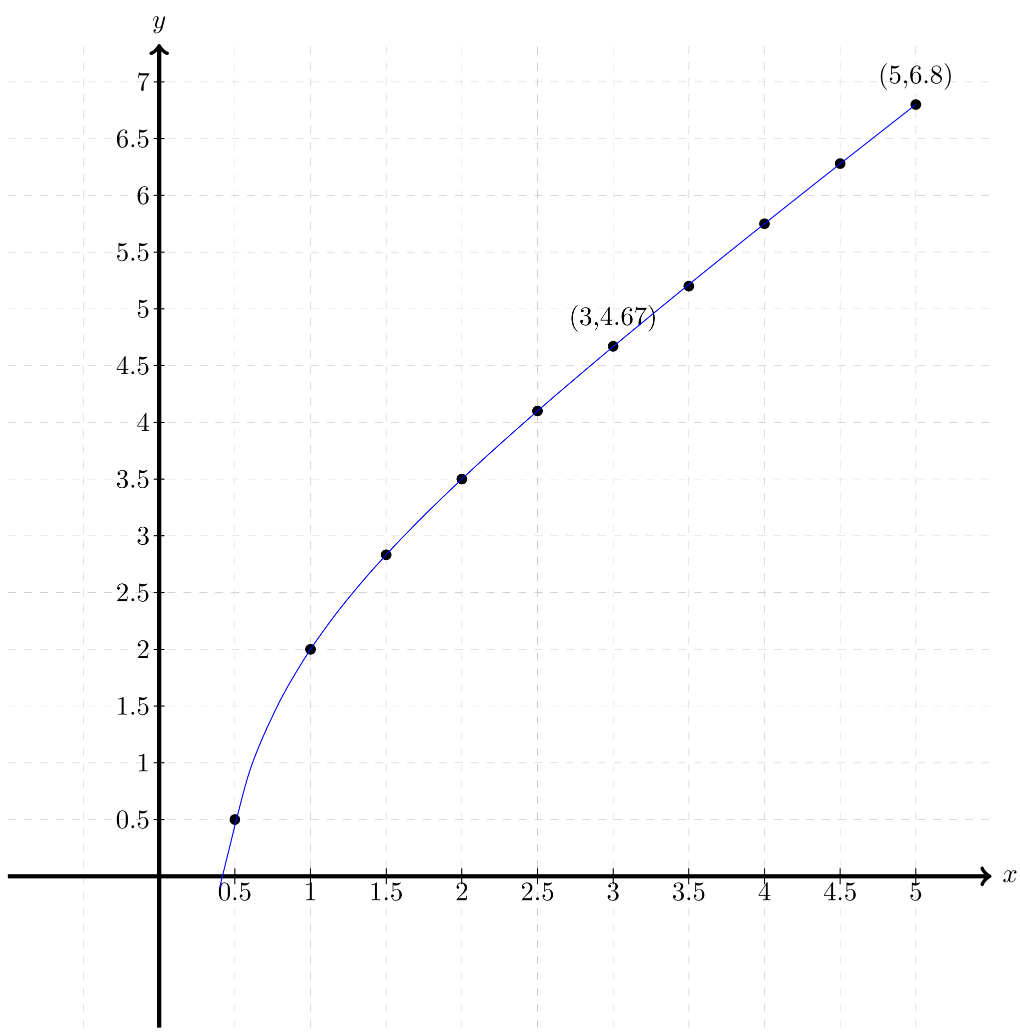
(L8) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***left endpoints*** of $n = 8$ rectangles.

(R8) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***right endpoints*** of $n = 8$ rectangles.

(T8) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using of $n = 8$ ***trapezoids***.

Approximate Integration - PART II

5. After staring the data for a few weeks, one might notice that the data seems to fit the plot of the function
$$f(x) = x + 2 - \frac{1}{x}$$
when x is between 0.5 and 5. Here's the plot one last time, with the graph of $f(x) = x + \frac{1}{x}$ superimposed on it.



Compute the integral
$$\int_{0.5}^{4.5} \left(x - \frac{1}{x} + 2\right)\, dx$$
and compare its value with those gotten by approximations using right endpoints, midpoints and trapezoids. Which one is the closest to the actual value of the integral?

.

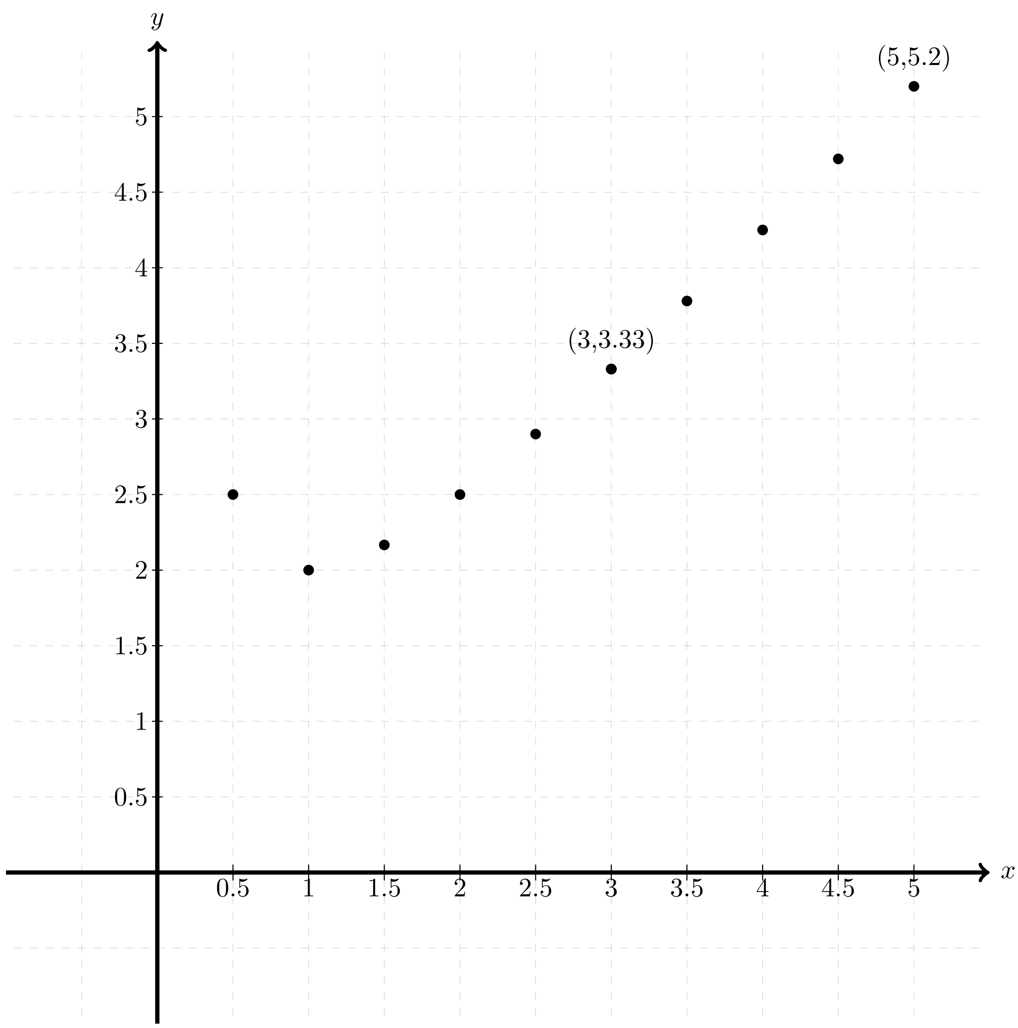
M112 - 3 – Fall 2019 – Maryam Khaqan

Approximate Integration

A radar gun is used to measure the speed of a certain runner during the first five seconds of a race. The data is given in the following table.

t(seconds)	v(meters per second)	t(seconds)	v(meters per second)
0.5	2.5	3	3.33
1	2	3.5	3.78
1.5	2.16	4	4.25
2	2.5	4.5	4.72
2.5	2.9	5	5.2

Your job is to approximate the distance travelled by the runner in the between the times $t = 0.5$ second and $t = 4.5$ seconds. Here's a plot of the data. The x-axis is time, measured in seconds. The y-axis is speed, measured in meters per second.



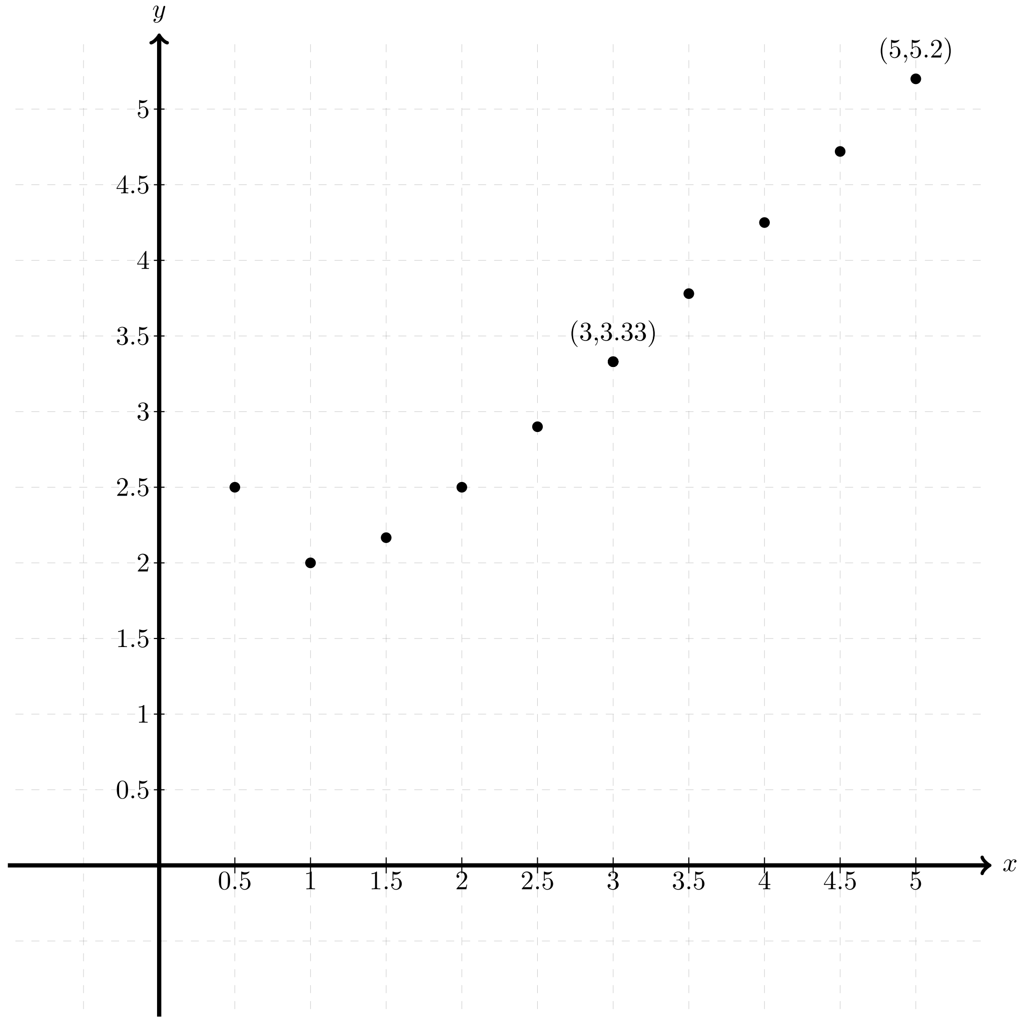
1. On the above plot, divide the interval between $x = 0.5$ and $x = 4.5$ into 4 equal subintervals. Then, on each subinterval, draw a rectangle whose top **right endpoint** lies on one of the data points plotted on the graph.

(a) Compute the total area of the 4 rectangles.

(b) The area you computed in part (a) approximates the area under a certain curve. What physical quantity does the area being approximated represent?

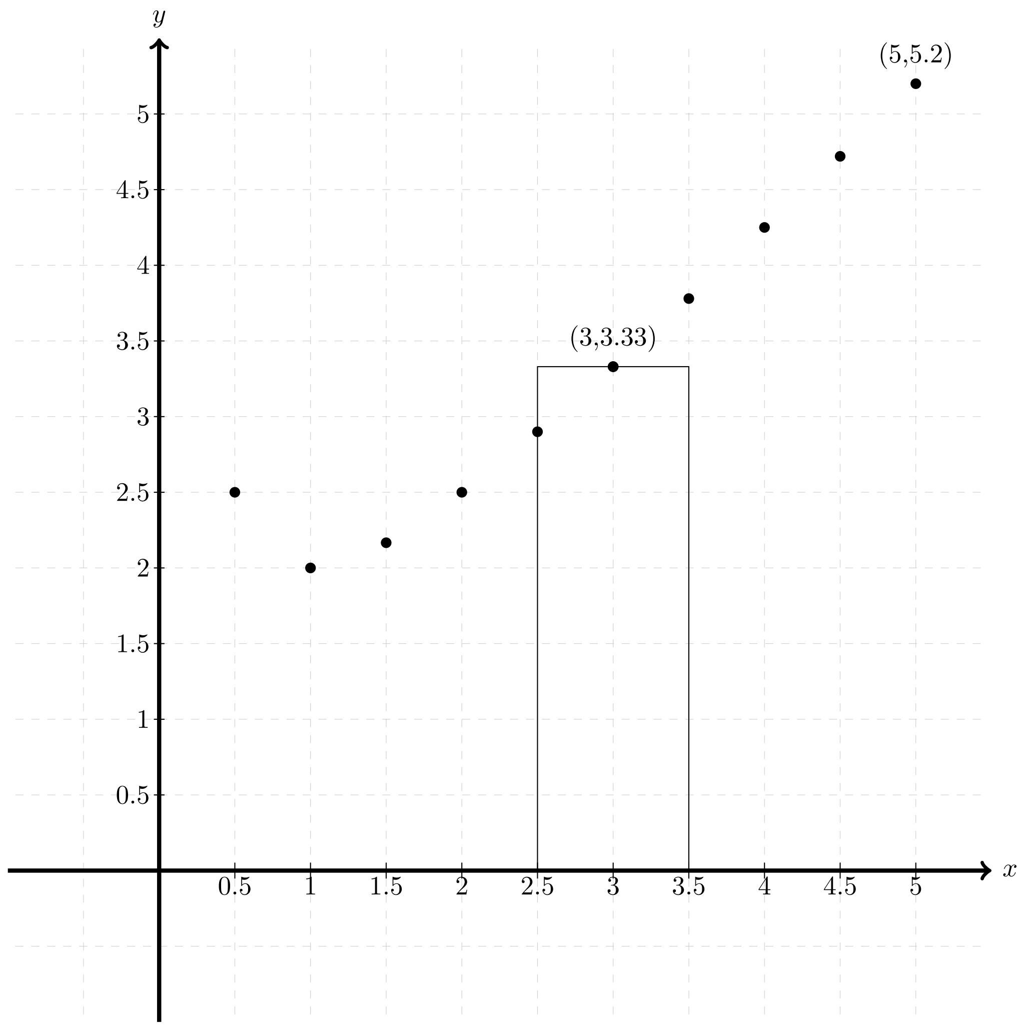
(c) Is this an overestimate or an underestimate? If it's an overestimate, can you think of a way of getting an underestimate, and vice versa? Talk to group mates and come up with at least two different ways you could get an underestimate.

2. Repeat the above process using 8 rectangles instead.



Is this a better or worse approximation (compared to Question 2) of the actual area under the curve? Explain why you think this is better or worse. Do your groupmates agree with you?

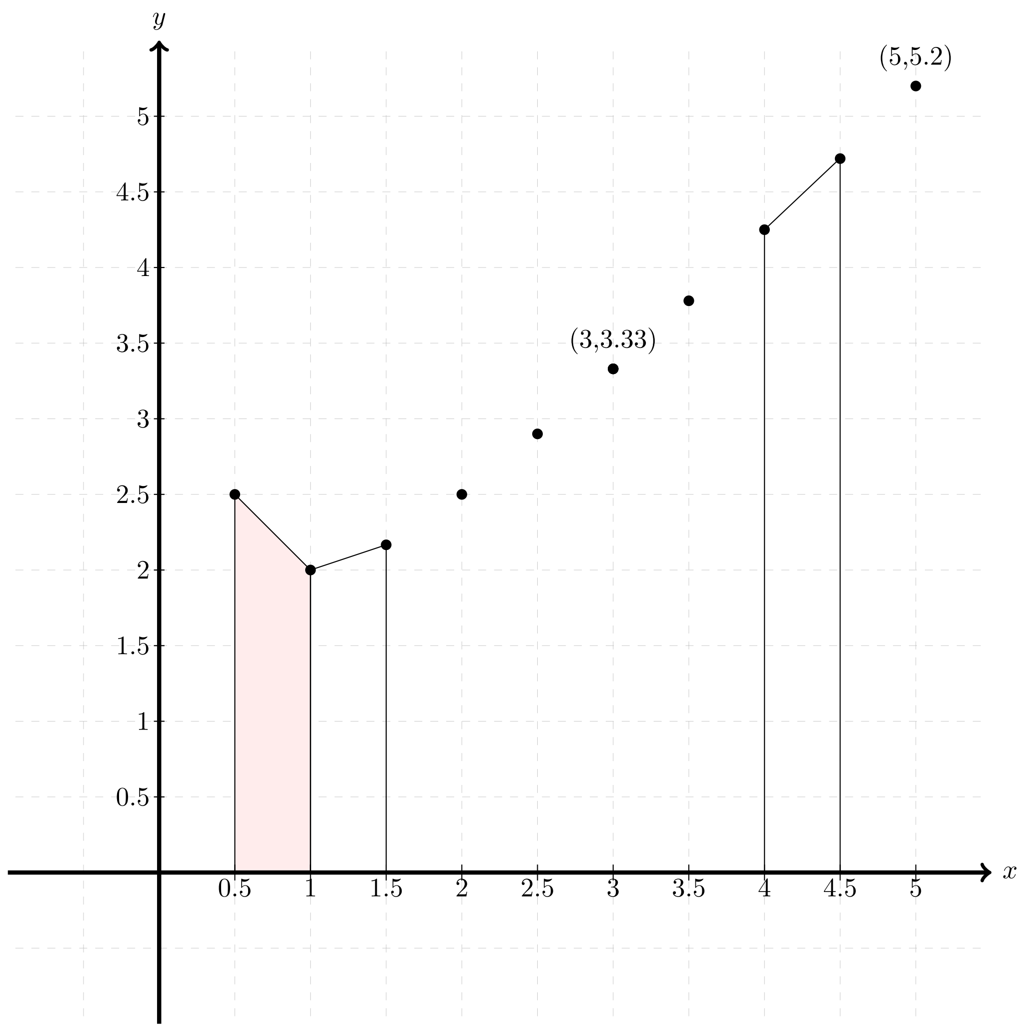
3. Here's the plot from the first page again. This time draw 4 rectangles such that the plotted data points (between $x = 0.5$ and $x = 4.5$) are **midpoints** of the top of the rectangles. One example is drawn for you.



Calculate the total area of these rectangles. Which of the 3 answers you've gotten (right endpoints w/ 4 rectangles, right endpoints w/ 8 rectangles, midpoints with 4 rectangles) do you think approximates the distance best?

Can you repeat this exercise with 8 such rectangles? Explain.

4. Here's the same plot again. This time, instead of drawing rectangles, draw 8 **trapezoids.** A couple of these are already drawn for you, continue the pattern until you use up all data points.



Recall that the area of a trapezoid is width*(average of heights), for example, for the first trapezoid in the plot above (shaded in), the area is given by

$$0.5 * \frac{2.5 + 2}{2} = 1.125.$$

Calculate the total area of the trapezoids.

(To be turned in as a group)

Based on your findings, arrange the following quantities in ascending order.

(I) The integral $\int_{0.5}^{4.5} f(x)\,dx$.

(L4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***left endpoints*** of $n = 4$ rectangles.

(R4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***right endpoints*** of $n = 4$ rectangles.

(M4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***midpoints*** of $n = 4$ rectangles.

(T4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using of $n = 4$ ***trapezoids***.

$$\boxed{\qquad\qquad} \le \boxed{\qquad\qquad} \le \boxed{\qquad\qquad} \le \boxed{\qquad\qquad} \le \boxed{\qquad\qquad}$$

Which of the following quantities gives the best approximation for the integral

$$\textit{(I)} = \int_{0.5}^{4.5} f(x)\,dx.$$

(L4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***left endpoints*** of $n = 4$ rectangles.

(R4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***right endpoints*** of $n = 4$ rectangles.

(M4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***midpoints*** of $n = 4$ rectangles.

(T4) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using of $n = 4$ ***trapezoids***.

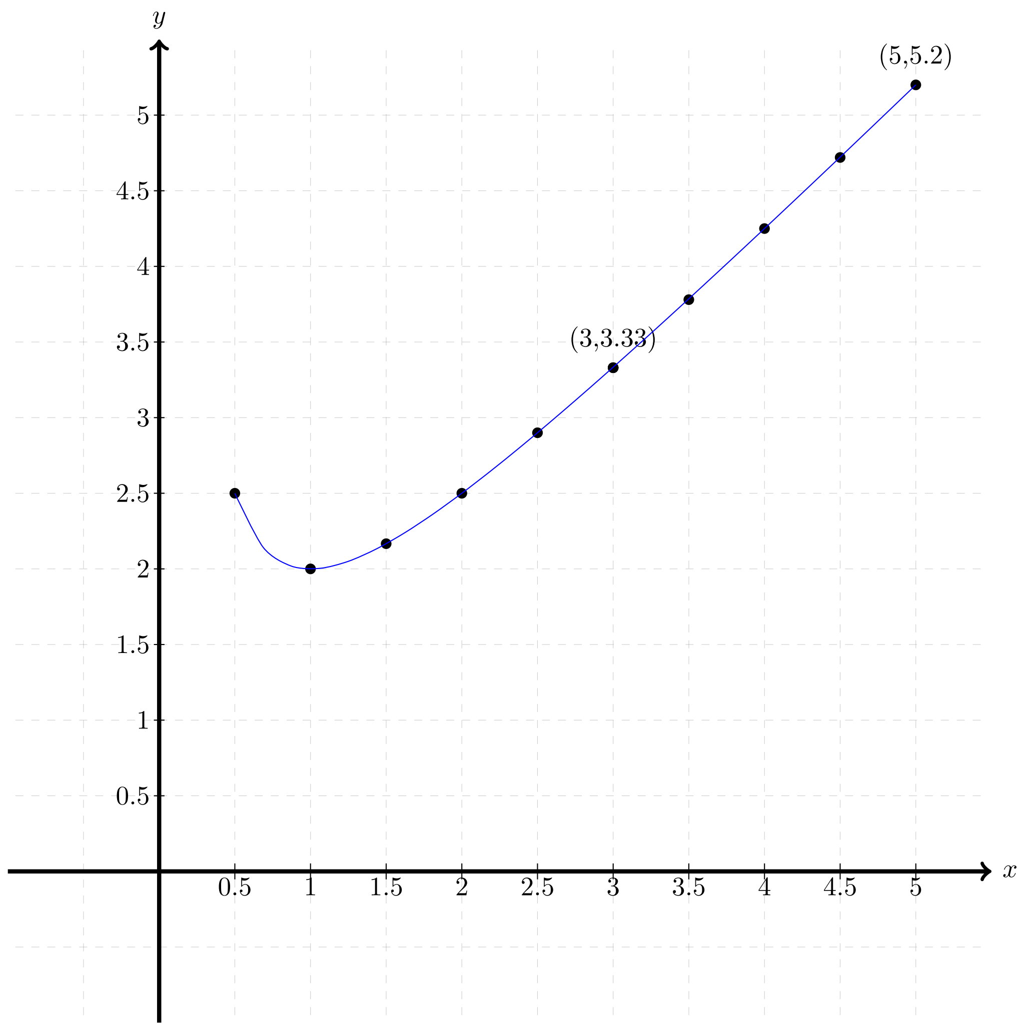
(L8) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***left endpoints*** of $n = 8$ rectangles.

(R8) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using ***right endpoints*** of $n = 8$ rectangles.

(T8) The approximation of $\int_{0.5}^{4.5} f(x)\,dx$ obtained using of $n = 8$ ***trapezoids***.

Approximate Integration - PART II

5. After staring the data for a few weeks, one might notice that the data seems to fit the plot of the function
$$f(x) = x + \frac{1}{x}$$
when x is between 0.5 and 5. Here's the plot one last time, with the graph of $f(x) = x + \frac{1}{x}$ superimposed on it.



Compute the integral
$$\int_{0.5}^{4.5} \left(x + \frac{1}{x} \right) \, dx$$
and compare its value with those gotten by approximations using right endpoints, midpoints and trapezoids. Which one is the closest to the actual value of the integral?

6. Examples of Student Work

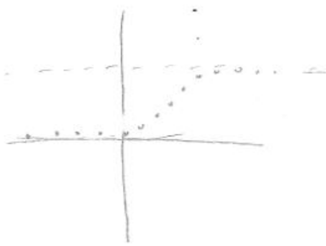
Here I will list some examples of mathematical writing questions I have used in the past, and selected student responses to these questions.

- Example 1: **(Calculus 2, Spring 2018)**
  - Topic: Monotone Convergence Theorem
  - Question:
    - $a)$ State the monotone convergence theorem.
    - $b)$ Argue in your own words why the monotone convergence theorem should be true. Feel free to support your argument with a diagram.
  - Selected student responses:

1. (4 points) State the Monotone Convergence Theorem.

If a sequence is bounded (meaning there is some number K that it is always below and some number J that it is always above) and monotonic (meaning that it is either always increasing or always decreasing), then the sequence converges.

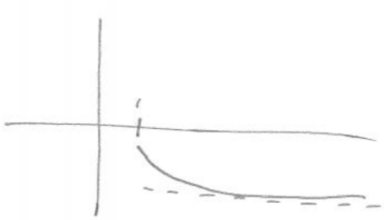
2. (3 points) Argue in your own words why the monotone convergence theorem should be true. Feel free to support your answer with a diagram.



This makes sense because the sequence is "boxed in" by upper and lower bounds, so it cannot go to ∞ or $-\infty$. It also makes sense that it must be monotone because something that ascilates (like cosine) will not converge.

2. (3 points) Argue in your own words why the monotone convergence theorem should be true. Feel free to support your answer with a diagram.

Say a sequence is ~~increasing~~ decreasing from $[1, \infty)$ and has some number such that the sequence can never be ~~higher~~ lower than it; in that instance, it would only go closer and closer to that number without passing it. Thus, it will have to converge



- EXAMPLE 2: **(Calculus 1, Fall 2018)**
  - Topics: Intermediate Value Theorem, Rolle's theorem.
  - Question: Consider the polynomial $f(x) = 2x + \sin(x)$.

$a)$ Use Intermediate value theorem to show that $f(x) = 2x + \sin(x)$ has a root in the interval $[-\pi, \pi]$.

$b)$ Argue in a couple of sentences why $f(x) = 2x + \sin(x)$ has no other real root.

- See the next page for selected student responses to part $b)$

• EXAMPLE 3: **(Calculus 2, Fall 2019)**
  - Topic: Comparison test for integrals.
  - Question: Suppose $f(x)$ and $g(x)$ are continuous functions. In each of the following scenarios, explain in words what *the comparison test for integrals* tells you about the integral

$$\int_5^\infty f(x)\,dx.$$

Hint: Pay attention to the inequalities in each case!

CASE I: When $f(x) \geq g(x) \geq 0$ and $\int_5^\infty g(x)\,dx$ **diverges.**

CASE II: When $f(x) \geq g(x) \geq 0$ and $\int_5^\infty g(x)\,dx$ **converges.**

CASE III: When $0 \leq f(x) \leq g(x)$ and $\int_5^\infty g(x)\,dx$ **diverges.**

CASE IV: When $0 \leq f(x) \leq g(x)$ and $\int_5^\infty g(x)\,dx$ **converges.**

  - Click here for selected student responses.

(b) (10 points) Argue in a couple sentences why $f(x) = 2x + \sin(x)$ has no other real root. Show any computations you need to support your argument. *(Hint: Trying to solve for the roots directly won't help you here, you need a Calculus argument.)*

~~f[x]=2x+sinx has no other real root because the second derivative of the function f(x)=2x+sin(x) is -sinx. This shows us that the concavity of the function does not change throughout its domain. Thus, it can have~~

$\frac{dy}{dx} = 2x + \sin(x)$

$\frac{dy}{dx} = 2 + \cos x.$

$\frac{d^2y}{dx^2} = 0 - \sin x$

$\frac{d^2y}{dx^2} = -\sin x$

f[x] = 2x+sinx has no other real root. because the second derivative of the funtion f[x] = 2x+sin[x] is -sinx. ~~This shows~~ Furthermore, the first derivative is 2+cosx. The first derivative shows that the funtion is always increasing. Therefore, it is impossible for the funtion to have any other root and since the range of cosx is $-1 \leq x \leq 1$ when added to 2 will always give a positive answer indicating an always increasing funtion.

(b) (10 points) Argue in a couple sentences why $f(x) = 2x + \sin(x)$ has no other real root. Show any computations you need to support your argument. *(Hint: Trying to solve for the roots directly won't help you here, you need a Calculus argument.)*

$f'(x) = \cos(x) + 2$

$(\cos(x) + 2)$ always > 0

$\therefore$ always increasing

$\therefore$ when f(x) cross x-axis once, it will increase, so no root after (at right side) the root between $[-\pi, \pi]$

also, always increase before cross x-axis so no root before (at left side) the root between $[-\pi, \pi]$

$\therefore$ ~~only~~ f(x) has no other real root

10

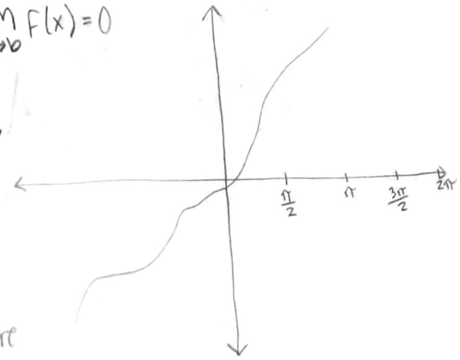
10

(b) (10 points) Argue in a couple sentences why $f(x) = 2x + \sin(x)$ has no other real root. Show any computations you need to support your argument. *(Hint: Trying to solve for the roots directly won't help you here, you need a Calculus argument.)*

$-1 \le \sin(x) \le 1$

$\lim_{a \to b} f(x) = 0$

$2x - 1 \le f(x) \le 2x + 1$



all values where $x > 0$ are positive, while all values where $x < 0$ are negative, this means that any values $x = a$ and $x = b$ we take where one is negative and one is positive will have the one root in between them. As a gets closer to b, it gets closer to the root, until the distance between a and b is so small that you're at (0,0)

if a and b are positive, f(a) and f(b) are also positive, so there is no root

if a and are negative, f(a) and f(b) are also negative so there is no root.

(only when one is -ve and the other is +ve, which only happens once)

(b) (10 points) Argue in a couple sentences why $f(x) = 2x + \sin(x)$ has no other real root. Show any computations you need to support your argument. *(Hint: Trying to solve for the roots directly won't help you here, you need a Calculus argument.)*

$f'(x) = 2 + \cos(x) = 0.$

$\cos(x) = -2.$

Since $-1 \le \cos(x) \le 1$,

$\cos(x)$ cannot have a value of -2.

$\therefore f'(x) = 0$ doesn't exist.

$\therefore$ there will be no maximum or minimum point in the interval $[-\pi, \pi]$, also, there will be no change of the function from positive to negative or negative to positive. Means that once the function crosses the x-axis and has one root, it cannot get another root, it only crosses x-axis once

8. (8 points) Suppose $f(x)$ and $g(x)$ are continuous functions. In each of the following scenarios, explain in words what *the comparison test for integrals* tells you about the integral

$$\int_5^\infty f(x)\,dx.$$

Hint: Pay attention to the $\boxed{\textit{inequalities}}$ *in each case!*

(a) **CASE I**: When $f(x) \geq g(x) \geq 0$ and $\int_5^\infty g(x)\,dx$ **diverges.**

$\int_5^\infty f(x)dx$ diverges because its integral (the area under the graph $f(x)$) will always include and larger than that of $\int_5^\infty g(x)\,dx$

(b) **CASE II**: When $f(x) \geq g(x) \geq 0$ and $\int_5^\infty g(x)\,dx$ **converges.**

The function diverge. Using example of $\frac{1}{x^2}$ and $\frac{1}{x}$, the first one is smaller than the second one, however, $\int_0^\infty \frac{1}{x^2} = 1$ while $\int_0^\infty \frac{1}{x}$ diverges, same applies here

(c) **CASE III**: When $0 \leq f(x) \leq g(x)$ and $\int_5^\infty g(x)\,dx$ **diverges.**

The function $\int_5^\infty f(x)$ ~~diverges~~ converges ~~because the area of~~ same as reasons in case II except $f(x)$ is now the smaller function, just like $\frac{1}{x^2}$ and $\frac{1}{x}$

(d) **CASE IV**: When $0 \leq f(x) \leq g(x)$ and $\int_5^\infty g(x)\,dx$ **converges.**

The integral converges as well, because the larger integral $\int_5^\infty g(x)$ has a finite area under the graph of $g(x)$, any function that's smaller than $g(x)$ would have an area under the curve smaller than that of $g(x)$. So $\int_5^\infty f(x)dx$ is finite and converges

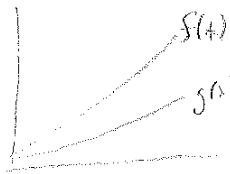
8. (8 points) Suppose $f(x)$ and $g(x)$ are continuous functions. In each of the following scenarios, explain in words what *the comparison test for integrals* tells you about the integral

$$\int_5^\infty f(x)\,dx.$$

Hint: Pay attention to the inequalities in each case!

(a) **CASE I**: When $f(x) \geq g(x) \geq 0$ and $\int_5^\infty g(x)\,dx$ **diverges.**

greater greater



$\boxed{\int_5^\infty f(x)\,dx \text{ diverges}}$

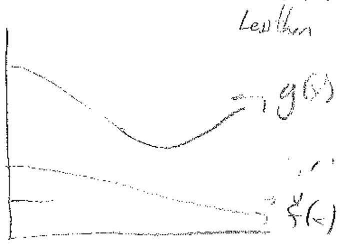
(b) **CASE II**: When $f(x) \geq g(x) \geq 0$ and $\int_5^\infty g(x)\,dx$ **converges.**

greater greater

$\boxed{\int_5^\infty f(x)\,dx \text{ may either converge or diverge}}$

(c) **CASE III**: When $0 \leq f(x) \leq g(x)$ and $\int_5^\infty g(x)\,dx$ **diverges.**

Less than less than



$\boxed{\int_5^\infty f(x)\,dx \text{ can determine}}$

(d) **CASE IV**: When $0 \leq f(x) \leq g(x)$ and $\int_5^\infty g(x)\,dx$ **converges.**

less less

$\boxed{\int_5^\infty f(x)\,dx \text{ converges}}$

- EXAMPLE 4: **(Calculus 2, Fall 2019)**
  - Topic: Integral Test
  - Question:
    - $a)$ Determine whether the following series converges or diverges.

$$\sum_{n=1}^{\infty} \frac{n^2}{e^{2n}}$$

    - $b)$ Determine whether the following integral converges or diverges.

$$\int_{1}^{\infty} \frac{x^2}{e^{2x}}$$

  - Selected student responses on the following page.

6. (a) (6 points) Determine whether the following series converges or diverges. Indicate any theorem/test you're using and make sure to verify that the series satisfies all hypotheses of that theorem.

$$\sum_{n=1}^{\infty} \frac{n^2}{e^{2n}}$$

$\frac{(n+1)^2}{e^{2n+2}} \cdot \frac{e^{2n}}{n^2} = \frac{(n+1)^2}{e^2 n^2} \cdot \frac{1}{e^2} \lim_{n\to\infty} (1+1/n)^2 = (1) \cancel{\frac{1}{e^2}}$

$\frac{1}{e^2} < 1$ therefore this series converges via Ratio Test

(b) (4 points) Determine whether the following integral converges or diverges. Indicate any theorem/test you're using and make sure to verify that the integral satisfies all hypotheses of that theorem. **You do not need to compute the integral.**

$$\int_1^{\infty} \frac{x^2}{e^{2x}}\,dx$$

Hint: $\frac{d}{dx}\frac{x^2}{e^{2x}} = -2\frac{x}{e^{2x}}(x-1)$.

$\sum_{n=1}^{\infty} \frac{n^2}{e^{2n}}$ converges because this was the previous question.

Function is also decreasing because the derivative you gave me is negative for all $n > 1$

Also, the function is positive. Therefore because this test is if and only if statement, because the series converges, the integral must as well.

e^{2n+2} $\frac{2n}{n^2}$

6. (a) (6 points) Determine whether the following series converges or diverges. Indicate any theorem/test you're using and make sure to verify that the series satisfies all hypotheses of that theorem.

$$\sum_{n=1}^{\infty} \frac{n^2}{e^{2n}}$$

Ratio test

Condition: any terms

$$\lim_{n\to\infty}\left|\frac{a_{n+1}}{a_n}\right| = \lim_{n\to\infty}\left|\frac{(n+1)^2}{e^{2(n+1)}}\cdot\frac{e^{2n}}{n^2}\right| = \lim_{n\to\infty}\left|\frac{n^2+1+2n}{n^2}\cdot\frac{\cancel{e^{2n}}}{\cancel{e^{2n}}\cdot e^2}\right|$$

$$= \lim_{n\to\infty}\left|\left(1+\frac{1}{n^2}+\frac{2}{n}\right)\cdot\frac{1}{e^2}\right|$$

$$= \lim_{n\to\infty}\left|1\cdot\frac{1}{e^2}\right|$$

$$= \frac{1}{e^2}$$

Since the $\lim_{n\to\infty}\left|\frac{a_{n+1}}{a_n}\right| = \frac{1}{e^2} < 1$ because $e>1$, so $\sum_{n=1}^{\infty}\frac{n^2}{e^{2n}}$ absolutely converges.

(b) (4 points) Determine whether the following integral converges or diverges. Indicate any theorem/test you're using and make sure to verify that the integral satisfies all hypotheses of that theorem. **You do not need to compute the integral.**

$$\int_1^{\infty} \frac{x^2}{e^{2x}}\,dx$$

Hint: $\frac{d}{dx}\frac{x^2}{e^{2x}} = -2\frac{x}{e^{2x}}(x-1)$.

Integral test

conditions: positive ✓ $\frac{x^2}{e^{2x}} > 0$

countinous ✓

decreasing:

$\frac{d}{dx}\frac{x^2}{e^{2x}} = -2\frac{x}{e^{2x}}(x-1) < 0$,

So it's decreasing. ✓

So integral test applies, if $\sum_{n=1}^{\infty}\frac{n^2}{e^{2n}}$ diverges/converges, $\int_1^{\infty}\frac{x^2}{e^{2x}}\,dx$ diverges/converge.

From Pr 6, $\sum_{n=1}^{\infty}\frac{n^2}{e^{2n}}$ absolutely converges. Therefore, $\int_1^{\infty}\frac{x^2}{e^{2x}}\,dx$ converges.

.

Emory Math Circle – Fall 2018

Cubing Cubes!

Our main activity today has to do with large cubes made out of smaller cubes. A typical example is *the Rubik's cube*. We say a Rubik's cube is a 3-cube, since each side is made out three little cubes. We will work together to answer the following **main question:**

"If I paint the outside of a 101-cube, how many little cubes have no paint on them?"

To answer that question, we will do what mathematician regularly do: we will come up with easier to answer questions which might lead us to the answer to the harder question we started with.

Answer the following with the help of your teammates:

1. If I start with a 2-cube (i.e. a cube whose side length is 2 little cubes), how many little cubes do I need to add to it, to make it a 3-cube.

2. How many little cubes do I need to add to make a 3-cube into a 4-cube?

3. What about going from a 4-cube to a 5-cube?

4. Do you see a pattern? Can you make a guess for how many cubes you'd need to add to an $n-$cube to make it an $(n+1)$-cube, where n is any number I want?

If you were successful in answering Q4, notice that it has made our original problem slightly easier: if I know something about a 100-cube, maybe that will help me answer something about a 101-cube. Answer the following series of problems to find more clues.

5. Start with a 3-cube. How many little cubes do you need to add to it to make a 5-cube?

6. Start with a 3-cube. How many little cubes do you need to add to make an 11-cube?

7. Start with a 3-cube, can you figure out how many little cubes you need to add to make any n-cube, for n any number greater than 3?

8. Does answering Q7 correctly help with answering our **main question**? Explain why or why not.

9. Now imagine we start with a 5-cube which is hollow, i.e. you've only built the outside using little cubes. How many little cubes do you need to fill it up?

10. Answer the same question as above, but for a 7-hollow cube. What about a 17-hollow cube?

11. How about an n-hollow cube, where n is any number?

12. Use everything you've learnt up till now to try to answer the main question that we started with.

Challenge Problem – Four-dimensional cubes!

13. *Answer all the same questions as above but for a four dimensional cube instead!*

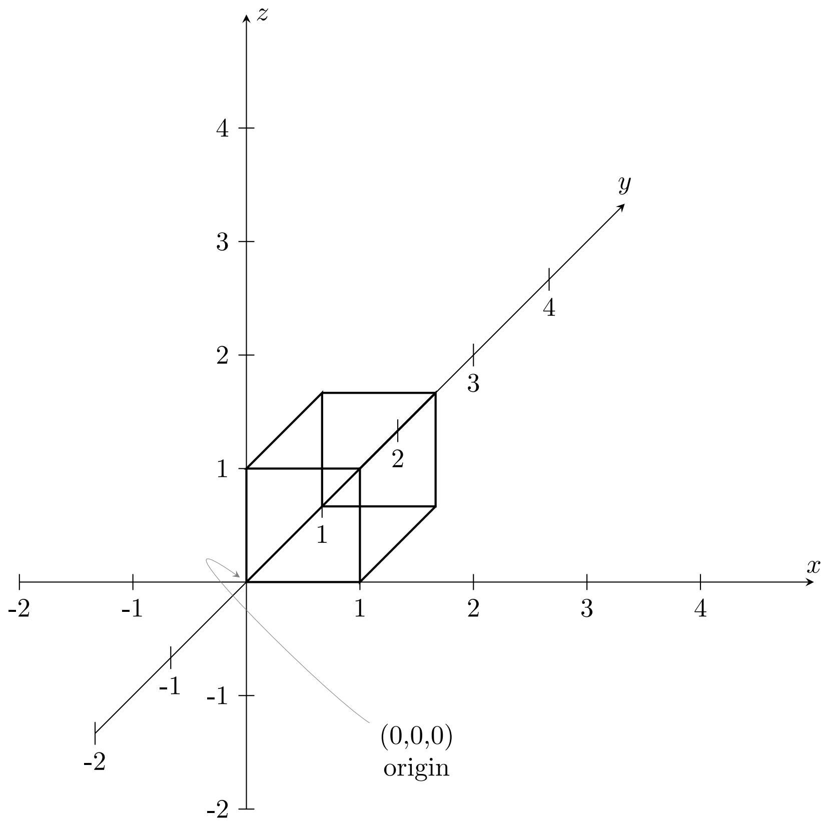
    To do this, you first have to develop an intuition for what it means to be a 4 dimensional cube. We only see things in 3 dimensions, but math works the same in any number of dimensions!

    What would a Rubik's cube look like in 4 dimensions? Do we still want it to be a 3-"cube"?

    What does it even mean to be a "cube" in four dimensions? We will call a four dimensional "cube" a *hypercube* to differentiate it from a regular cube.

    What does it mean for a four dimensional cube to be hollow? What does it mean to paint the "outside" of a hypercube?

    One way to answer all these questions is to develop what it means to be a "cube," what it means to be "hollow" and "on the outside/inside" for a three-dimensional cube in a purely mathematical sense and then generalize that to four dimensions. To get you started, here's a picture of a little three dimensional cube places on the coordinate axis.



14. Use a pencil or crayons to draw a 3-cube on the above picture.

15. We can label each little cube by the coordinates of their upper right corner. e.g. the cube in the picture can be labelled by (1,1,1). If I paint the outside of a 3-cube that lies on the axes, can you come up with a mathematical description of all the little cubes that will have at least one side painted?

16. Can you generalize your mathematical description to four dimensional axes? Hint: The little cube in the picture will generalize to a hypercube called **(1,1,1,1)**

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Fa 2019)

Course: MATH-112-3: Calculus II - Fall 2019

Instructor: Maryam Khaqan *

Response Rate: 15/19 (78.95 %)

1 - Percentage of classes you did NOT attend.					
Response Option	**Weight**	**Frequency**	**Percent**	**Percent Responses**	**Means**
0%	(1)	8	53.33%		
1-5%	(2)	7	46.67%		
6-10%	(3)	0	0.00%		
11-15%	(4)	0	0.00%		
16-20%	(5)	0	0.00%		
21-25%	(6)	0	0.00%		
26-30%	(7)	0	0.00%		
31-40%	(8)	0	0.00%		
41-50%	(9)	0	0.00%		
51-60%	(10)	0	0.00%		
61-80%	(11)	0	0.00%		
81-99%	(12)	0	0.00%		
				0 25 50 100	
Response Rate					
15/19 (78.95%)					

2 - You are taking this course (select all that apply):					
Response Option	**Weight**	**Frequency**	**Percent**	**Percent Responses**	
To complete a General Education Requirement	(1)	5	33.33%		
For your major/minor	(2)	8	53.33%		
As a prerequisite for another course	(3)	7	46.67%		
As a pre-professional requirement	(4)	2	13.33%		
Because you are interested in the subject	(5)	8	53.33%		
Response Rate	15/19 (78.95%)				

3 - Your expected grade:					
Response Option	**Weight**	**Frequency**	**Percent**	**Percent Responses**	**Means**
A	(1)	2	13.33%		
A-	(2)	3	20.00%		
B+	(3)	2	13.33%		
B	(4)	3	20.00%		
B-	(5)	3	20.00%		
C+	(6)	0	0.00%		
C	(7)	1	6.67%		
C-	(8)	1	6.67%		
D+	(9)	0	0.00%		
D	(10)	0	0.00%		
				0 25 50 100	
Response Rate					
15/19 (78.95%)					

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Fa 2019)

Course: MATH-112-3: Calculus II - Fall 2019

Instructor: Maryam Khaqan *

Response Rate: 15/19 (78.95 %)

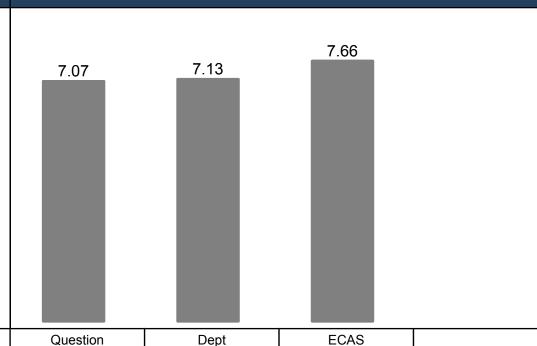
4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

How well organized was the class?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	1	6.67%
2	(2)	1	6.67%
3	(3)	0	0.00%
4	(4)	0	0.00%
5 (Somewhat)	(5)	1	6.67%
6	(6)	0	0.00%
7	(7)	4	26.67%
8	(8)	2	13.33%
9 (Very)	(9)	6	40.00%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	7.07	2.55	8.00	1170	7.13	2.14	8.00	23998	7.66	1.85	8.00

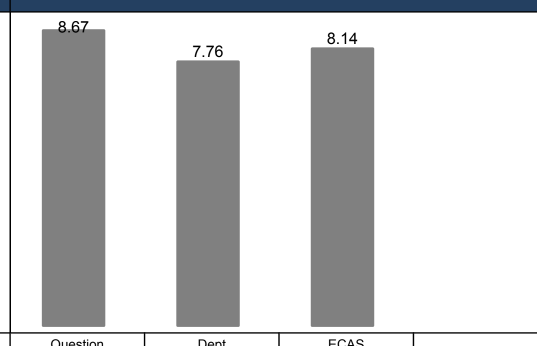
4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

Was the instructor enthusiastic about the material?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	0	0.00%
4	(4)	0	0.00%
5 (Somewhat)	(5)	0	0.00%
6	(6)	0	0.00%
7	(7)	1	6.67%
8	(8)	3	20.00%
9 (Very)	(9)	11	73.33%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	8.67	0.62	9.00	1170	7.76	1.89	9.00	23998	8.14	1.57	9.00

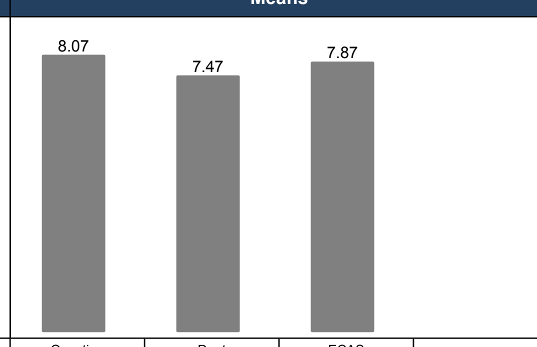
4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

How concerned was the instructor with what students learned from the course?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	0	0.00%
4	(4)	1	6.67%
5 (Somewhat)	(5)	1	6.67%
6	(6)	0	0.00%
7	(7)	0	0.00%
8	(8)	5	33.33%
9 (Very)	(9)	8	53.33%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	8.07	1.53	9.00	1170	7.47	2.05	8.00	23998	7.87	1.77	9.00

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Fa 2019)

Course: MATH-112-3: Calculus II - Fall 2019

Instructor: Maryam Khaqan *

Response Rate: 15/19 (78.95 %)

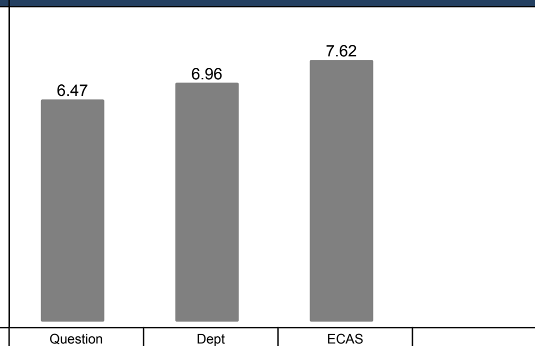
4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

How clearly did the instructor explain specific concepts relevant to the course?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	2	13.33%
3	(3)	1	6.67%
4	(4)	1	6.67%
5 (Somewhat)	(5)	0	0.00%
6	(6)	2	13.33%
7	(7)	3	20.00%
8	(8)	1	6.67%
9 (Very)	(9)	5	33.33%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	6.47	2.59	7.00	1170	6.96	2.36	8.00	23998	7.62	1.92	8.00

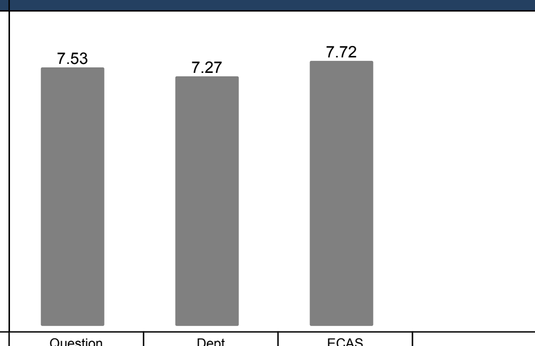
4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

How clearly did the instructor communicate the objectives and requirements for the course?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	2	13.33%
4	(4)	0	0.00%
5 (Somewhat)	(5)	0	0.00%
6	(6)	1	6.67%
7	(7)	2	13.33%
8	(8)	3	20.00%
9 (Very)	(9)	7	46.67%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	7.53	2.07	8.00	1170	7.27	2.19	8.00	23998	7.72	1.86	9.00

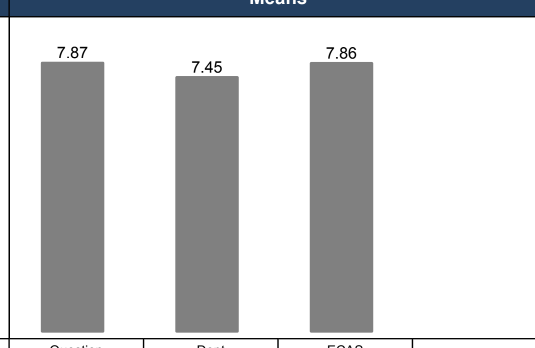
4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

How well did the instructor respond to students' questions?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	0	0.00%
4	(4)	1	6.67%
5 (Somewhat)	(5)	1	6.67%
6	(6)	1	6.67%
7	(7)	1	6.67%
8	(8)	3	20.00%
9 (Very)	(9)	8	53.33%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	7.87	1.64	9.00	1170	7.45	2.15	8.00	23998	7.86	1.80	9.00

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Fa 2019)

Course: MATH-112-3: Calculus II - Fall 2019

Instructor: Maryam Khaqan *

Response Rate: 15/19 (78.95 %)

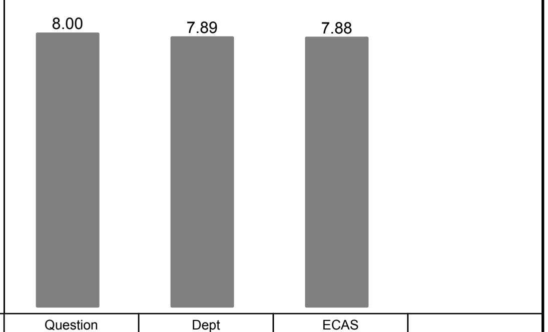
4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

How accessible was the instructor for individual discussion about the course?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	0	0.00%
4	(4)	1	6.67%
5 (Somewhat)	(5)	2	13.33%
6	(6)	0	0.00%
7	(7)	1	6.67%
8	(8)	0	0.00%
9 (Very)	(9)	11	73.33%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	8.00	1.81	9.00	1170	7.89	1.77	9.00	23998	7.88	1.80	9.00

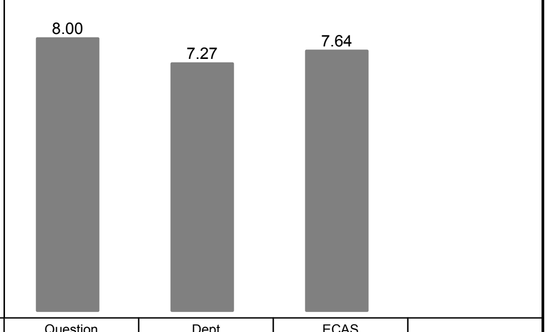
5 - How much did this course promote your progress on the following learning objectives?

Acquiring factual knowledge.

Response Option	Weight	Frequency	Percent
1. Not at all or very little	(1)	0	0.00%
2.	(2)	0	0.00%
3.	(3)	0	0.00%
4.	(4)	1	6.67%
5. Somewhat	(5)	0	0.00%
6.	(6)	1	6.67%
7.	(7)	2	13.33%
8.	(8)	3	20.00%
9. Very much	(9)	8	53.33%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	8.00	1.46	9.00	1147	7.27	2.08	8.00	20902	7.64	1.88	8.00

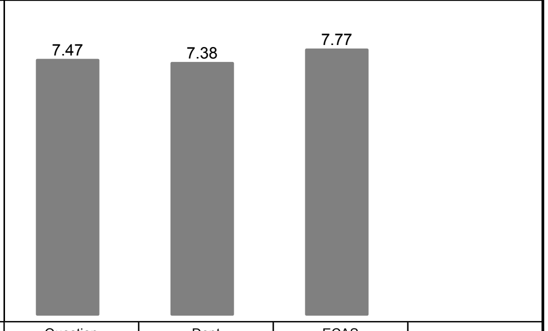
5 - How much did this course promote your progress on the following learning objectives?

Understanding basic principles and concepts.

Response Option	Weight	Frequency	Percent
1. Not at all or very little	(1)	0	0.00%
2.	(2)	1	6.67%
3.	(3)	0	0.00%
4.	(4)	0	0.00%
5. Somewhat	(5)	0	0.00%
6.	(6)	3	20.00%
7.	(7)	2	13.33%
8.	(8)	3	20.00%
9. Very much	(9)	6	40.00%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	7.47	1.92	8.00	1147	7.38	2.04	8.00	20902	7.77	1.79	9.00

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Fa 2019)

Course: MATH-112-3: Calculus II - Fall 2019

Instructor: Maryam Khaqan *

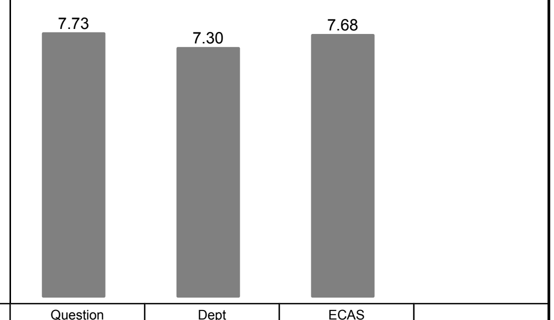
Response Rate: 15/19 (78.95 %)

5 - How much did this course promote your progress on the following learning objectives?

Being able to apply facts, concepts and principles to specific questions.

Response Option	Weight	Frequency	Percent
1. Not at all or very little	(1)	0	0.00%
2.	(2)	0	0.00%
3.	(3)	0	0.00%
4.	(4)	0	0.00%
5. Somewhat	(5)	2	13.33%
6.	(6)	1	6.67%
7.	(7)	3	20.00%
8.	(8)	2	13.33%
9. Very much	(9)	7	46.67%
N/A	(0)	0	0.00%

Means



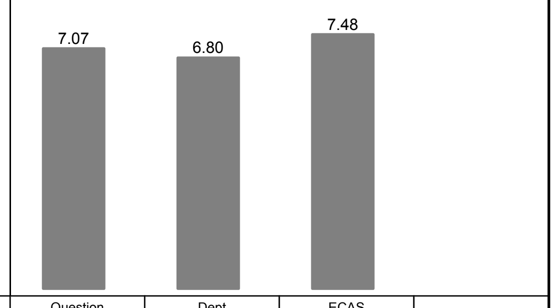
Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	7.73	1.49	8.00	1147	7.30	2.08	8.00	20902	7.68	1.88	8.00

5 - How much did this course promote your progress on the following learning objectives?

Being able to assess or critique ideas and arguments.

Response Option	Weight	Frequency	Percent
1. Not at all or very little	(1)	1	6.67%
2.	(2)	0	0.00%
3.	(3)	0	0.00%
4.	(4)	0	0.00%
5. Somewhat	(5)	2	13.33%
6.	(6)	2	13.33%
7.	(7)	3	20.00%
8.	(8)	1	6.67%
9. Very much	(9)	6	40.00%
N/A	(0)	0	0.00%

Means



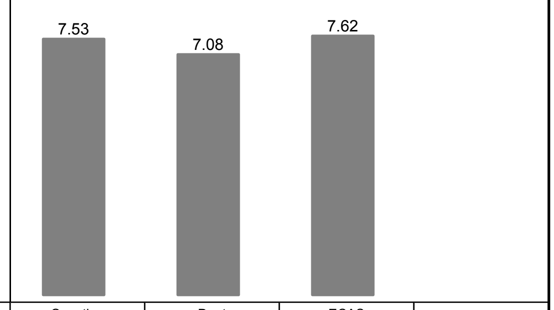
Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	7.07	2.25	7.00	1147	6.80	2.41	8.00	20902	7.48	2.05	8.00

5 - How much did this course promote your progress on the following learning objectives?

Being able to integrate and synthesize information.

Response Option	Weight	Frequency	Percent
1. Not at all or very little	(1)	0	0.00%
2.	(2)	0	0.00%
3.	(3)	1	6.67%
4.	(4)	0	0.00%
5. Somewhat	(5)	0	0.00%
6.	(6)	2	13.33%
7.	(7)	4	26.67%
8.	(8)	2	13.33%
9. Very much	(9)	6	40.00%
N/A	(0)	0	0.00%

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	7.53	1.68	8.00	1147	7.08	2.22	8.00	20902	7.62	1.93	8.00

Course: MATH-112-3: Calculus II - Fall 2019

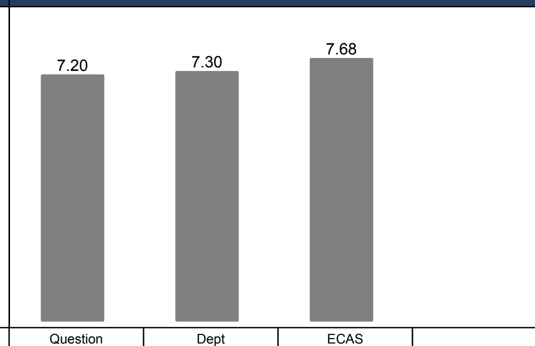
Instructor: Maryam Khaqan *

Response Rate: 15/19 (78.95 %)

6 - Please answer the following questions, again focusing on the instructor (Maryam Khaqan). -

How well did the exams and/or assignments reflect the course material?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	1	6.67%
3	(3)	1	6.67%
4	(4)	0	0.00%
5 (Somewhat)	(5)	0	0.00%
6	(6)	2	13.33%
7	(7)	2	13.33%
8	(8)	4	26.67%
9 (Very)	(9)	5	33.33%
N/A	(0)	0	0.00%

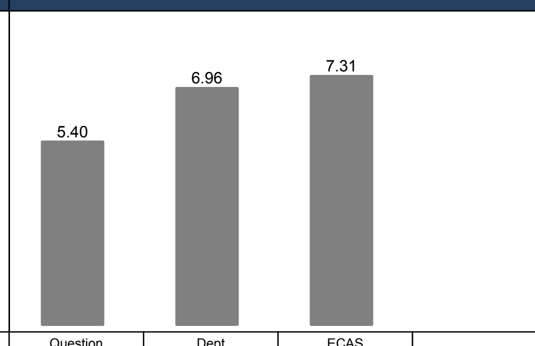


Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	7.20	2.18	8.00	1170	7.30	2.05	8.00	23998	7.68	1.85	8.00

6 - Please answer the following questions, again focusing on the instructor (Maryam Khaqan). -

Was the instructor's feedback on exams, papers, performance useful?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	3	20.00%
2	(2)	2	13.33%
3	(3)	0	0.00%
4	(4)	0	0.00%
5 (Somewhat)	(5)	2	13.33%
6	(6)	2	13.33%
7	(7)	0	0.00%
8	(8)	2	13.33%
9 (Very)	(9)	4	26.67%
N/A	(0)	0	0.00%

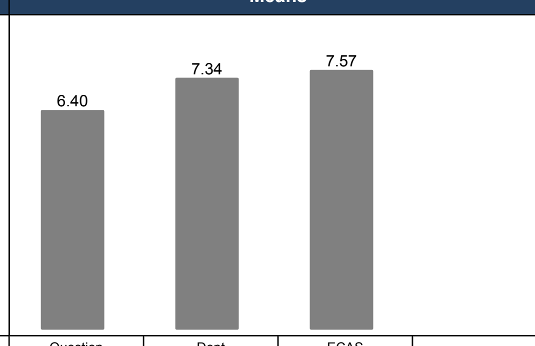


Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	5.40	3.25	6.00	1170	6.96	2.36	8.00	23998	7.31	2.21	8.00

6 - Please answer the following questions, again focusing on the instructor (Maryam Khaqan). -

Were the instructor's grading criteria for the course clear?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	2	13.33%
2	(2)	0	0.00%
3	(3)	1	6.67%
4	(4)	1	6.67%
5 (Somewhat)	(5)	1	6.67%
6	(6)	1	6.67%
7	(7)	0	0.00%
8	(8)	5	33.33%
9 (Very)	(9)	4	26.67%
N/A	(0)	0	0.00%



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
15/19 (78.95%)	6.40	2.90	8.00	1170	7.34	2.11	8.00	23998	7.57	1.99	8.00

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Fa 2019)

Course: MATH-112-3: Calculus II - Fall 2019

Instructor: Maryam Khaqan *

Response Rate: 15/19 (78.95 %)

7 - Optional comments on the course:	
Response Rate	2/19 (10.53%)

- Hard with poor calculus background
- This course is really interesting for any math or econ/math students.

8 - Optional comments on the instructor (Maryam Khaqan): -	
Response Rate	3/19 (15.79%)

- Enthusiastic professor but poor teacher
- She is really really really enthusiastic about teaching this class and very concerned about our learning during and after class. However, she is not really accessible outside the class and her office hours are usually conflicted with many people's class (being around noon). I hope one thing that she can improve on is to slow down the pace and be more clear about the course material. Lots of times I have totally lost during the class and have to read the textbook afterward to understand the material. However, every time I read the textbook I realized that the material itself wasn't hard at all. I hope she can be more clear about course material during class time in the future.
- Maryam is a very enthusiastic professor who constantly demonstrates he love for the material and he desire to help her students. I would recommend that she spend more time doing examples in front of the class, rather than simply explaining topics and moving on. Examples were scarce and it was hard for me to learn some of the new topics at times. Despite this one criticism, Maryam was an great professor who cared about her students.

9 - Please comment on the strengths and weaknesses of the course.	
Response Rate	15/19 (78.95%)

- Organized course, can be difficult
- The course covers some interesting material. However, quiz and exam questions were often significantly more difficult than the suggested practice problems from the book, so it was remarkably difficult to prepare for.
- The course was very organized, but it would have been better if the exams were at the same level of difficulty as the examples discussed in class.
- very well organized, very clear grading criteria
- The course was decently structured and knowing the topic that we were going over that specific day. But, maybe being more clear with what section of the textbook that the lesson was in because sometimes I knew what topic we were going over but not the specific section in the book.
- This course actually motivated me to pursue higher level math courses and not merely stop at Calculus 2 which is required for my major. However, I feel that a weakness of this course or at least the grading for the course is that there is an imbalance between quizzes and homework assignments. People tend to score better on homework assignments compared to quizzes, which tends to bring down grades and this demotivates students.
- Not very analytical, but the mathematical skills this builds is fantastic.
- . . .
- The course design is pretty well.
- I think it is sometimes difficult to cover all the things we should during classtime due to time constraints. Some things felt rushed not because of the instructor but because it is difficult to balance out going through things and covering everything at the same time. I'm a CS major and it would be nicer to see how the content of this course relates to my area of specialization. Maybe I didn't come across anything because I have just started the major but none of the material seemed to be explicitly connected to computers.
- It was a very hard class but I learned a lot.
- There were no serious weaknesses and the course was well organised
- The course is very straightforward, but there is almost too much material covered
- It covered a lot of important topics, but the wide range of topics in a short amount of time led to a shallow knowledge about each of the topics.
- Useful information/applicable in life Some things are unnecessary and time-consuming for no reason

Course:	MATH-112-3: Calculus II - Fall 2019
Instructor:	Maryam Khaqan *
Response Rate:	15/19 (78.95 %)

10 - Please comment on the strengths and weaknesses of the instructor.

Maryam Khaqan

Response Rate	15/19 (78.95%)

- Organized, always prepared for class, enthusiastic of the course A poor teacher; goes through the material too fast with bad handwriting. Much easier to study off the textbook
- The instructor was not very organized and left very little time for us to both copy down important information and understand what was going on during lectures. She also did not seem conscious of the fact that some students could have already seen some of the material before (in AP, IB, dual enrollment, etc. programs), and the class seemed like it was being taught as if everyone in the class had already seen the material.
- Professor Khaqan cares a lot about what students learn in the class, and it helped me a lot in learning math.
- strengths- organized, good at making difficult concepts much more clear
- The instructor was readily available outside of class even outside of office hours to answer questions which I appreciated. But, for feedback on exams I did not like the gradescope grading because it was not clear where I lost points on the exams and was overall confusing and too different for me. I prefer having comments on the physical exam paper itself instead of a screenshot and a rubric.
- She is a good instructor who is highly approachable within and outside class. She sometimes may lose track of her train of thought but that is understandable and her decision to having quizzes weekly is good as it helps students stay up to date with everything taught in class.
- She is very enthusiastic about what she does and I love and resonate with that. She is able to answer questions really well and is highly encouraging towards us. Sometimes can be a little unorganised and beats around the bush. Appreciate how she solves examples in class and then makes us do it She is very sweet and helps us a lot.
- . . .
- As I have mentioned above.
- I think she is very approachable and friendly. People feel insecure about math and I think her attitude helped overcome that insecurity, helping people ask questions when they don't understand something or raise their hands to make comments/guess answers. Sometimes things she teaches aren't clear at first glance, but she is very receptive to feedback and she always makes sure you understand everything if you meet with her outside of the class. She feels passionate about the material (not always the material that she's teaching but math in general)
- She is very smart but sometimes doesn't explain all her steps.
- She was very knowledgeable and able to connect with her students
- I like her enthusiasm toward the subject, but the class is very unorganized and I wish there were more homework grades
- She was very enthusiastic about the material, but she could have provided more examples to illustrate the topics to the class. Her knowledge of the material was great, but at times she had troubles explaining the material to the students.
- Made sure we all knew what we were learning

11 - Would you recommend this course to another student? Why or why not?

Response Rate	15/19 (78.95%)

- Yes
- I don't know. The material can be interesting, but the quality of this course is significantly influenced by the quality of the instructor.
- Yes, because it reduced my fear in math.
- yes. she is very passionate and well-organized
- Yes, I would recommend this course if the course is required for the student to take, but if not then no.
- This course is definitely worth it as it establishes a fundamental understanding of math concepts to a lot of majors, especially for STEM majors.
- Yes! This course is the basics of so much math that cna be applied anywhere in all fields. We talk about real life applications in class and as a physics major I see the use of so mant of these techniques and concepts coming up in physics.
- . . .
- yes, because it's a requirement for many majors.
- No because people would prefer an easier class if they are taking this to fulfill a GER. If they are taking it for a core requirement, then they have no other choice.
- Yes because I ended up learning a lot.
- Yes, it was a good intro to higher math
- I would recommend this course because it is an interesting topic and it is needed for pre professional work
- I would recommend this course, but only if they are ready to dedicate a large portion of their time to this class.
- Yes, if pursuing any math/science then it is required

Course: MATH-112-3: Calculus II - Fall 2019

Instructor: Maryam Khaqan *

Response Rate: 15/19 (78.95 %)

12 - Would you recommend this instructor to another student? Why or why not?	
Maryam Khaqan	
Response Rate	15/19 (78.95%)

- No, does not explain the material so that it is easy to understand. Makes the material overly complicated
- For the reasons listed above, I would not recommend this instructor to another student.
- Yes, because she is very caring of her students.
- yes. she is very passionate and well-organized
- Yes, I would recommend this instructor because even though the class structure was not perfect, she still did her best to make sure we understood the material.
- She is a good instructor who is highly approachable within and outside class. She sometimes may lose track of her train of thought but that is understandable and her decision to having quizzes weekly is good as it helps students stay up to date with everything taught in class. Overall, I would recommend this instructor to other students, only with the reservation that the options to drop quizzes which you don't perform as well in cannot be dropped.
- Yes I would. She created a very condusive environment to learn new things and to make mistakes as well. Math can be really daunting and she manages to tone that dauntiness down which I really appreciate.
- . . .
- It depends on what type of student they are. If they are students who enjoy lecturing from the professor, then I would not recommend her as the instructor. If the student loves self-studying then I would definitely recommend the student to take her class.
- Her quizzes/exams can sometimes be on the more difficult side, so I wouldn't recommend her to everyone, but if they actually want to learn the material, then I would definitely recommend her since she will make sure you understand the concepts as long as you spend time on understanding the material.
- Yes, she really cares about her student's success
- Yes, she was very helpful
- I would not recommend this instructor to another student because she is extremely hard compared to the other MATH 112 sections. She also only grades based on quizzes and tests, and not much else and there is no room for extra credit
- I would. She is very understanding and a great person as well as a great teacher.
- Yes, because she gets straight to the information and you never get lost

Mean of Means Calculations	Mean	Dept	ECAS	
Weighted Mean (Course)	**7.56**	**7.17**	**7.64**	
Weighted Mean (Instructor)	**7.27**	**7.35**	**7.73**	
Weighted Mean (Overall)	**7.37**	**7.29**	**7.70**	

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Sp 2020)

Course: MATH-112-6: Calculus II - Spring 2020
Instructor: Maryam Khaqan *
Response Rate: 12/16 (75.00 %)

1 - Percentage of classes you did NOT attend (whether on-campus or synchronous/online).					
Response Option	**Weight**	**Frequency**	**Percent**	**Percent Responses**	**Means**
0%	(1)	0	0.00%		
1-5%	(2)	3	25.00%		
6-10%	(3)	1	8.33%		
11-15%	(4)	1	8.33%		
16-20%	(5)	0	0.00%		
21-25%	(6)	3	25.00%		
26-30%	(7)	0	0.00%		
31-40%	(8)	0	0.00%		
41-50%	(9)	2	16.67%		
51-60%	(10)	0	0.00%		
61-80%	(11)	1	8.33%		
81-99%	(12)	1	8.33%		
				0 25 50 100	
Response Rate					
12/16 (75.00%)					

2 - You are taking this course (select all that apply):					
Response Option	**Weight**	**Frequency**	**Percent**	**Percent Responses**	
To complete a General Education Requirement	(1)	5	41.67%		
For your major/minor	(2)	11	91.67%		
As a prerequisite for another course	(3)	7	58.33%		
As a pre-professional requirement	(4)	1	8.33%		
Because you are interested in the subject	(5)	5	41.67%		
Response Rate	12/16 (75%)				

3 - Your expected grade:					
Response Option	**Weight**	**Frequency**	**Percent**	**Percent Responses**	**Means**
A	(1)	6	50.00%		
A-	(2)	3	25.00%		
B+	(3)	1	8.33%		
B	(4)	0	0.00%		
B-	(5)	0	0.00%		
C+	(6)	0	0.00%		
C	(7)	0	0.00%		
C-	(8)	0	0.00%		
D+	(9)	0	0.00%		
D	(10)	0	0.00%		
S	(11)	2	16.67%		
U	(12)	0	0.00%		
				0 25 50 100	
Response Rate					
12/16 (75.00%)					

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Sp 2020)

Course: MATH-112-6: Calculus II - Spring 2020

Instructor: Maryam Khaqan *

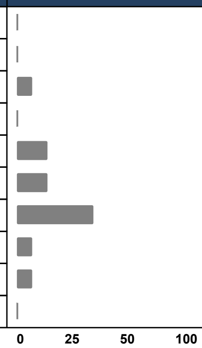
Response Rate: 12/16 (75.00 %)

4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

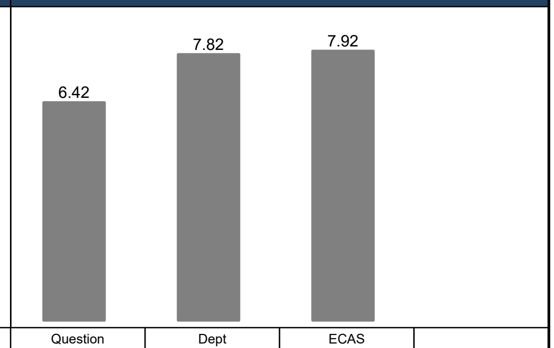
How well organized was the class?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	1	8.33%
4	(4)	0	0.00%
5 (Somewhat)	(5)	2	16.67%
6	(6)	2	16.67%
7	(7)	5	41.67%
8	(8)	1	8.33%
9 (Very)	(9)	1	8.33%
N/A	(0)	0	0.00%

Percent Responses



Means



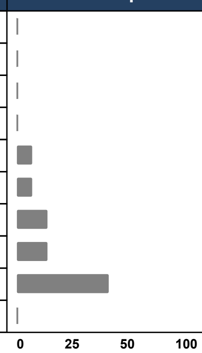
Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.42	1.56	7.00	777	7.82	1.68	9.00	14066	7.92	1.61	9.00

4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

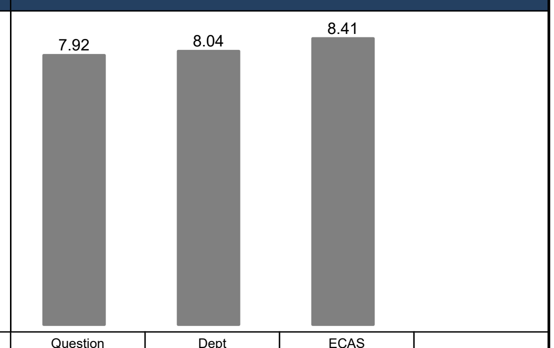
Was the instructor enthusiastic about the material?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	0	0.00%
4	(4)	0	0.00%
5 (Somewhat)	(5)	1	8.33%
6	(6)	1	8.33%
7	(7)	2	16.67%
8	(8)	2	16.67%
9 (Very)	(9)	6	50.00%
N/A	(0)	0	0.00%

Percent Responses



Means



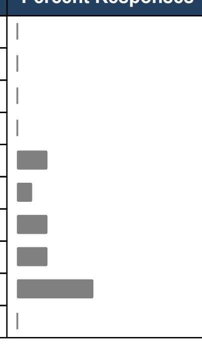
Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	7.92	1.38	8.50	777	8.04	1.65	9.00	14066	8.41	1.21	9.00

4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

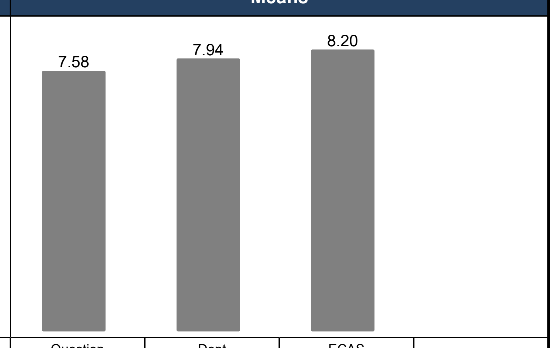
How concerned was the instructor with what students learned from the course?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	0	0.00%
4	(4)	0	0.00%
5 (Somewhat)	(5)	2	16.67%
6	(6)	1	8.33%
7	(7)	2	16.67%
8	(8)	2	16.67%
9 (Very)	(9)	5	41.67%
N/A	(0)	0	0.00%

Percent Responses



Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	7.58	1.56	8.00	777	7.94	1.76	9.00	14066	8.20	1.43	9.00

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Sp 2020)

Course: MATH-112-6: Calculus II - Spring 2020

Instructor: Maryam Khaqan *

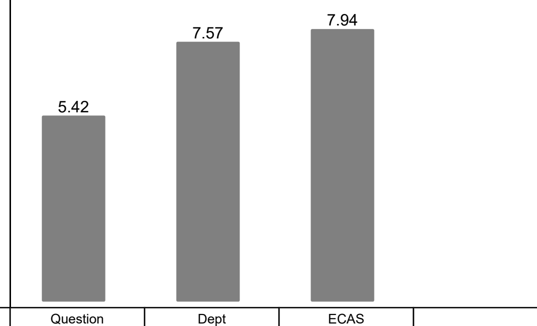
Response Rate: 12/16 (75.00 %)

4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

How clearly did the instructor explain specific concepts relevant to the course?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	1	8.33%
3	(3)	2	16.67%
4	(4)	1	8.33%
5 (Somewhat)	(5)	2	16.67%
6	(6)	2	16.67%
7	(7)	2	16.67%
8	(8)	1	8.33%
9 (Very)	(9)	1	8.33%
N/A	(0)	0	0.00%

Means



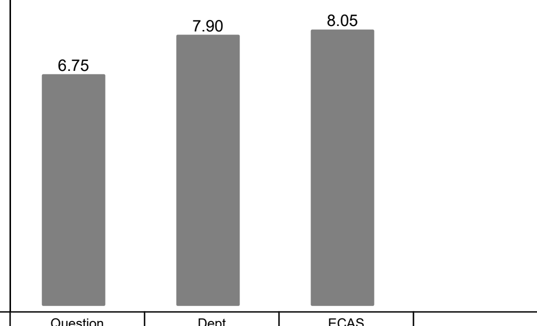
Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	5.42	2.15	5.50	777	7.57	2.05	8.00	14066	7.94	1.63	9.00

4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

How clearly did the instructor communicate the objectives and requirements for the course?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	0	0.00%
4	(4)	1	8.33%
5 (Somewhat)	(5)	3	25.00%
6	(6)	1	8.33%
7	(7)	2	16.67%
8	(8)	3	25.00%
9 (Very)	(9)	2	16.67%
N/A	(0)	0	0.00%

Means



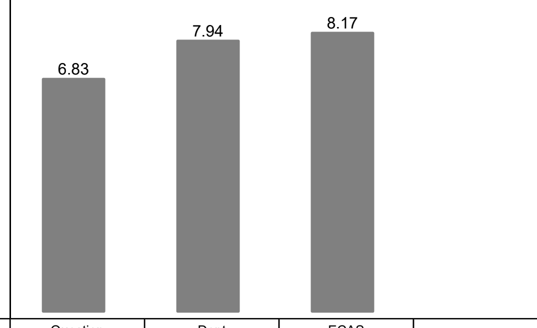
Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.75	1.71	7.00	777	7.90	1.74	9.00	14066	8.05	1.57	9.00

4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

How well did the instructor respond to students' questions?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	0	0.00%
4	(4)	1	8.33%
5 (Somewhat)	(5)	3	25.00%
6	(6)	1	8.33%
7	(7)	1	8.33%
8	(8)	4	33.33%
9 (Very)	(9)	2	16.67%
N/A	(0)	0	0.00%

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.83	1.75	7.50	777	7.94	1.83	9.00	14066	8.17	1.51	9.00

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Sp 2020)

Course: MATH-112-6: Calculus II - Spring 2020

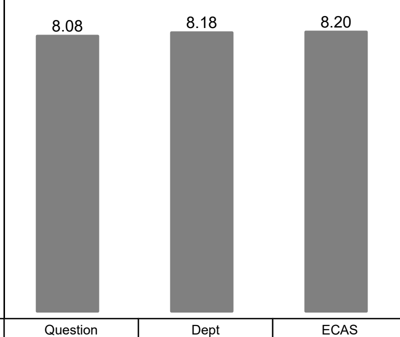
Instructor: Maryam Khaqan *

Response Rate: 12/16 (75.00 %)

4 - Please respond to the following questions focused on the instructor, Maryam Khaqan. -

How accessible was the instructor for individual discussion about the course?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	0	0.00%
4	(4)	0	0.00%
5 (Somewhat)	(5)	1	8.33%
6	(6)	1	8.33%
7	(7)	1	8.33%
8	(8)	2	16.67%
9 (Very)	(9)	7	58.33%
N/A	(0)	0	0.00%

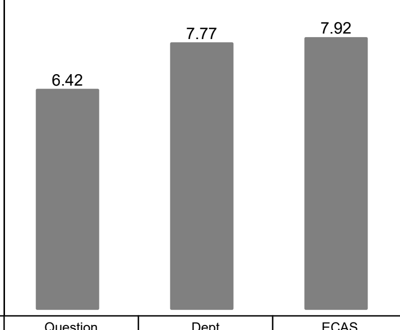


Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	8.08	1.38	9.00	777	8.18	1.57	9.00	14066	8.20	1.49	9.00

5 - How much did this course promote your progress on the following learning objectives?

Acquiring factual knowledge.

Response Option	Weight	Frequency	Percent
1. Not at all or very little	(1)	2	16.67%
2.	(2)	0	0.00%
3.	(3)	0	0.00%
4.	(4)	0	0.00%
5. Somewhat	(5)	1	8.33%
6.	(6)	1	8.33%
7.	(7)	3	25.00%
8.	(8)	2	16.67%
9. Very much	(9)	3	25.00%
N/A	(0)	0	0.00%

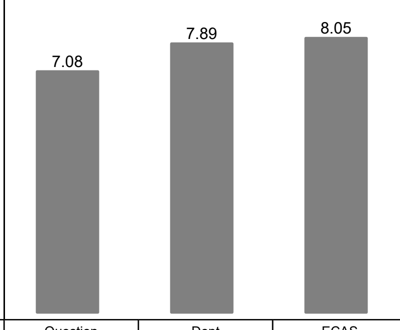


Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.42	2.81	7.00	764	7.77	1.81	9.00	13519	7.92	1.62	9.00

5 - How much did this course promote your progress on the following learning objectives?

Understanding basic principles and concepts.

Response Option	Weight	Frequency	Percent
1. Not at all or very little	(1)	0	0.00%
2.	(2)	1	8.33%
3.	(3)	0	0.00%
4.	(4)	0	0.00%
5. Somewhat	(5)	1	8.33%
6.	(6)	1	8.33%
7.	(7)	3	25.00%
8.	(8)	3	25.00%
9. Very much	(9)	3	25.00%
N/A	(0)	0	0.00%



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	7.08	2.02	7.50	764	7.89	1.71	9.00	13519	8.05	1.51	9.00

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Sp 2020)

Course: MATH-112-6: Calculus II - Spring 2020

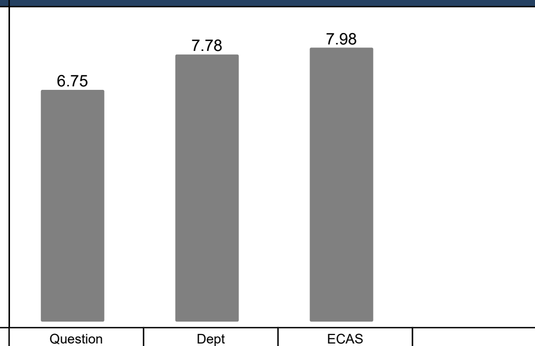
Instructor: Maryam Khaqan *

Response Rate: 12/16 (75.00 %)

5 - How much did this course promote your progress on the following learning objectives?

Being able to apply facts, concepts and principles to specific questions.

Response Option	Weight	Frequency	Percent
1. Not at all or very little	(1)	0	0.00%
2.	(2)	1	8.33%
3.	(3)	1	8.33%
4.	(4)	0	0.00%
5. Somewhat	(5)	0	0.00%
6.	(6)	1	8.33%
7.	(7)	4	33.33%
8.	(8)	3	25.00%
9. Very much	(9)	2	16.67%
N/A	(0)	0	0.00%

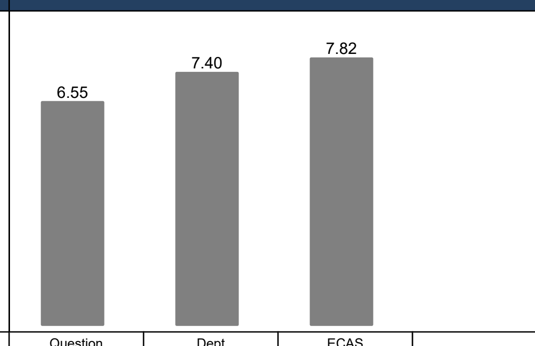


Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.75	2.18	7.00	764	7.78	1.79	9.00	13519	7.98	1.58	9.00

5 - How much did this course promote your progress on the following learning objectives?

Being able to assess or critique ideas and arguments.

Response Option	Weight	Frequency	Percent
1. Not at all or very little	(1)	0	0.00%
2.	(2)	1	8.33%
3.	(3)	0	0.00%
4.	(4)	1	8.33%
5. Somewhat	(5)	0	0.00%
6.	(6)	2	16.67%
7.	(7)	3	25.00%
8.	(8)	3	25.00%
9. Very much	(9)	1	8.33%
N/A	(0)	1	8.33%

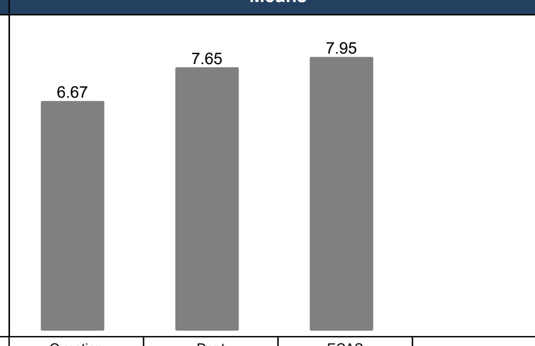


Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.55	2.02	7.00	764	7.40	2.13	8.00	13519	7.82	1.77	9.00

5 - How much did this course promote your progress on the following learning objectives?

Being able to integrate and synthesize information.

Response Option	Weight	Frequency	Percent
1. Not at all or very little	(1)	0	0.00%
2.	(2)	1	8.33%
3.	(3)	1	8.33%
4.	(4)	0	0.00%
5. Somewhat	(5)	0	0.00%
6.	(6)	2	16.67%
7.	(7)	3	25.00%
8.	(8)	3	25.00%
9. Very much	(9)	2	16.67%
N/A	(0)	0	0.00%



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.67	2.19	7.00	764	7.65	1.91	8.00	13519	7.95	1.63	9.00

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Sp 2020)

Course: MATH-112-6: Calculus II - Spring 2020

Instructor: Maryam Khaqan *

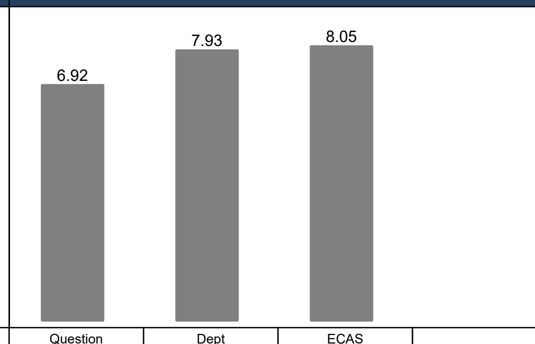
Response Rate: 12/16 (75.00 %)

6 - Please answer the following questions, again focusing on the instructor (Maryam Khaqan). -

How well did the exams and/or assignments reflect the course material?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	1	8.33%
4	(4)	0	0.00%
5 (Somewhat)	(5)	2	16.67%
6	(6)	1	8.33%
7	(7)	2	16.67%
8	(8)	4	33.33%
9 (Very)	(9)	2	16.67%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100



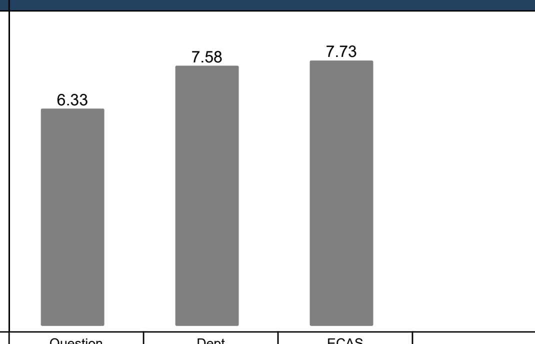
Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.92	1.83	7.50	777	7.93	1.61	9.00	14066	8.05	1.53	9.00

6 - Please answer the following questions, again focusing on the instructor (Maryam Khaqan). -

Was the instructor's feedback on exams, papers, performance useful?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	0	0.00%
2	(2)	2	16.67%
3	(3)	1	8.33%
4	(4)	0	0.00%
5 (Somewhat)	(5)	0	0.00%
6	(6)	0	0.00%
7	(7)	5	41.67%
8	(8)	2	16.67%
9 (Very)	(9)	2	16.67%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100



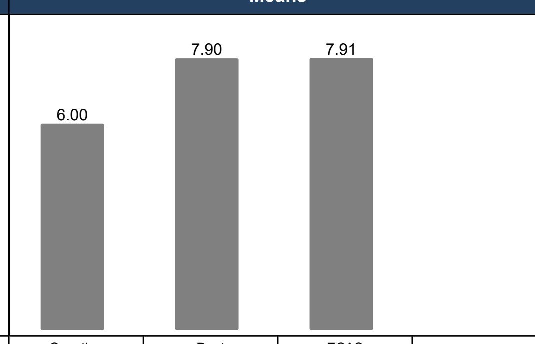
Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.33	2.53	7.00	777	7.58	1.95	8.00	14066	7.73	1.89	9.00

6 - Please answer the following questions, again focusing on the instructor (Maryam Khaqan). -

Were the instructor's grading criteria for the course clear?

Response Option	Weight	Frequency	Percent
1 (Not at all)	(1)	1	8.33%
2	(2)	2	16.67%
3	(3)	0	0.00%
4	(4)	0	0.00%
5 (Somewhat)	(5)	1	8.33%
6	(6)	1	8.33%
7	(7)	2	16.67%
8	(8)	3	25.00%
9 (Very)	(9)	2	16.67%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.00	2.86	7.00	777	7.90	1.79	9.00	14066	7.91	1.73	9.00

Course: MATH-112-6: Calculus II - Spring 2020

Instructor: Maryam Khaqan *

Response Rate: 12/16 (75.00 %)

7 - Optional comments on the course:

Response Rate	3/16 (18.75%)

- Scoring on exams must be more clear. For questions that could have multiple ways of answering them, the questions were only graded on what they wanted but they don't tell you what they expect. They need to more clear with what they are going to grade on.
- The reflections that were required were a waste of time. It only added a redundant assignment to my workload and even if I summarized what I learned it was not to the professor's satisfaction.
- It's a intro course that everyone needs to take. However, if you took AP calculus BC, then you have the credits to pass it.

8 - Optional comments on the instructor (Maryam Khaqan): -

Response Rate	2/16 (12.5%)

- Her lectures were fine sometimes but she spent too much time explaining why the theorem exists that we never were able to do examples with her, making the homework and quizzes very difficult.
- She very hard working

9 - Which of these best describes your primary physical location during the remote learning portion of this course?

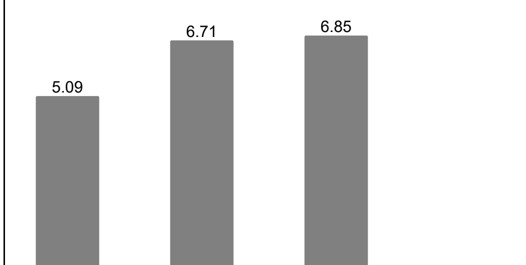
Response Option	Weight	Frequency	Percent	Percent Responses	Means
Atlanta metro area	(1)	3	25.00%		
Other U.S. location	(2)	8	66.67%		
International location	(3)	1	8.33%		
				0 25 50 100	

Response Rate
12/16 (75.00%)

10 - How effective were each of the following components in helping you achieve the stated learning outcomes? Mark "N/A" for those components not used in this course.

live Zoom sessions

Response Option	Weight	Frequency	Percent	Percent Responses	Means
1 (Not effective at all)	(1)	1	8.33%		
2	(2)	0	0.00%		
3	(3)	1	8.33%		
4	(4)	1	8.33%		
5 (About average)	(5)	4	33.33%		
6	(6)	2	16.67%		
7	(7)	1	8.33%		
8	(8)	0	0.00%		
9 (Very effective)	(9)	1	8.33%		
N/A	(0)	1	8.33%		
				0 25 50 100	Question Dept ECAS



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	5.09	2.07	5.00	764	6.71	2.33	7.00	13519	6.85	2.26	7.00

Course: MATH-112-6: Calculus II - Spring 2020

Instructor: Maryam Khaqan *

Response Rate: 12/16 (75.00 %)

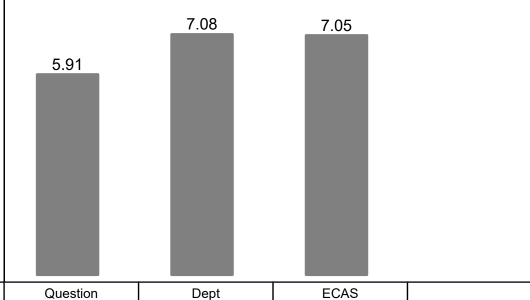
10 - How effective were each of the following components in helping you achieve the stated learning outcomes? Mark "N/A" for those components not used in this course.

recorded lectures

Response Option	Weight	Frequency	Percent
1 (Not effective at all)	(1)	0	0.00%
2	(2)	1	8.33%
3	(3)	0	0.00%
4	(4)	2	16.67%
5 (About average)	(5)	2	16.67%
6	(6)	1	8.33%
7	(7)	3	25.00%
8	(8)	0	0.00%
9 (Very effective)	(9)	2	16.67%
N/A	(0)	1	8.33%

Percent Responses: 0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	5.91	2.17	6.00	764	7.08	2.22	8.00	13519	7.05	2.22	8.00

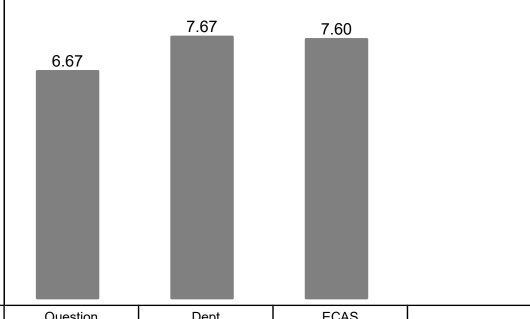
11 - How effective overall was the instructor’s use of technology in helping you achieve the stated learning outcomes?

Maryam Khaqan

Response Option	Weight	Frequency	Percent
1 (Not effective at all)	(1)	0	0.00%
2	(2)	0	0.00%
3	(3)	1	8.33%
4	(4)	1	8.33%
5 (Average or mixed)	(5)	2	16.67%
6	(6)	1	8.33%
7	(7)	2	16.67%
8	(8)	2	16.67%
9 (Very effective)	(9)	3	25.00%
N/A	(0)	0	0.00%

Percent Responses: 0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.67	2.06	7.00	777	7.67	1.86	8.00	14066	7.60	1.78	8.00

Course: MATH-112-6: Calculus II - Spring 2020

Instructor: Maryam Khaqan *

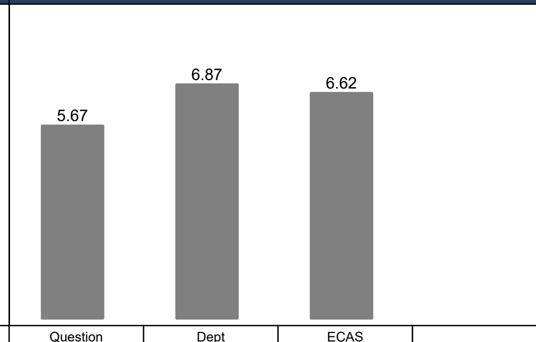
Response Rate: 12/16 (75.00 %)

12 - Answer each of the following questions about the remote learning portion of this course, in comparison with the on-campus portion of the course, with '1' representing "Much less effective," "Useless," or "Light workload," while '9' represents "Very effective," "Very Useful," or "Heavy workload."

effectiveness of the remote learning portion of the course in challenging you intellectually

Response Option	Weight	Frequency	Percent	Percent Responses
1	(1)	2	16.67%	
2	(2)	0	0.00%	
3	(3)	0	0.00%	
4	(4)	2	16.67%	
5	(5)	2	16.67%	
6	(6)	0	0.00%	
7	(7)	3	25.00%	
8	(8)	0	0.00%	
9	(9)	3	25.00%	
N/A	(0)	0	0.00%	
				0 25 50 100

Means



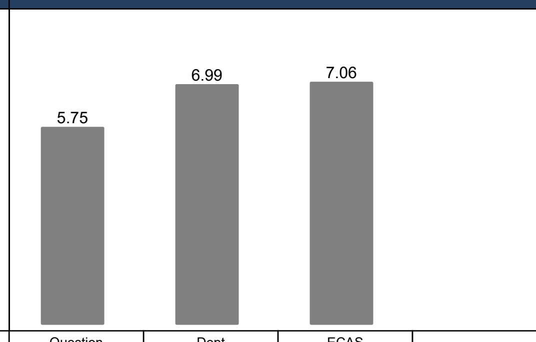
Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	5.67	2.84	6.00	764	6.87	2.25	7.00	13519	6.62	2.31	7.00

12 - Answer each of the following questions about the remote learning portion of this course, in comparison with the on-campus portion of the course, with '1' representing "Much less effective," "Useless," or "Light workload," while '9' represents "Very effective," "Very Useful," or "Heavy workload."

usefulness of the instructors' feedback

Response Option	Weight	Frequency	Percent	Percent Responses
1	(1)	1	8.33%	
2	(2)	0	0.00%	
3	(3)	1	8.33%	
4	(4)	1	8.33%	
5	(5)	3	25.00%	
6	(6)	1	8.33%	
7	(7)	1	8.33%	
8	(8)	3	25.00%	
9	(9)	1	8.33%	
N/A	(0)	0	0.00%	
				0 25 50 100

Means



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	5.75	2.38	5.50	764	6.99	2.23	8.00	13519	7.06	2.16	8.00

Emory University: Emory College of Arts and Sciences
ECAS Course Evaluations (Sp 2020)

Course: MATH-112-6: Calculus II - Spring 2020

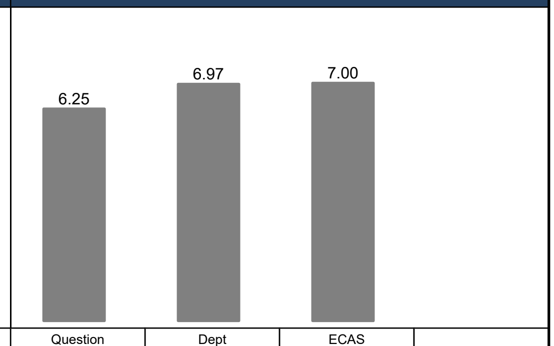
Instructor: Maryam Khaqan *

Response Rate: 12/16 (75.00 %)

12 - Answer each of the following questions about the remote learning portion of this course, in comparison with the on-campus portion of the course, with '1' representing "Much less effective," "Useless," or "Light workload," while '9' represents "Very effective," "Very Useful," or "Heavy workload."

instructors' ability to engage with the students in the remote environment

Response Option	Weight	Frequency	Percent
1	(1)	1	8.33%
2	(2)	0	0.00%
3	(3)	1	8.33%
4	(4)	0	0.00%
5	(5)	3	25.00%
6	(6)	0	0.00%
7	(7)	2	16.67%
8	(8)	3	25.00%
9	(9)	2	16.67%
N/A	(0)	0	0.00%

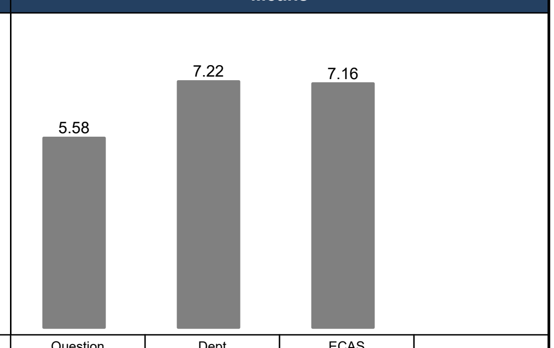


Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	6.25	2.49	7.00	764	6.97	2.31	8.00	13519	7.00	2.24	8.00

12 - Answer each of the following questions about the remote learning portion of this course, in comparison with the on-campus portion of the course, with '1' representing "Much less effective," "Useless," or "Light workload," while '9' represents "Very effective," "Very Useful," or "Heavy workload."

course's success in accomplishing the objectives stated in the course syllabus during remote learning

Response Option	Weight	Frequency	Percent
1	(1)	1	8.33%
2	(2)	0	0.00%
3	(3)	1	8.33%
4	(4)	2	16.67%
5	(5)	2	16.67%
6	(6)	2	16.67%
7	(7)	1	8.33%
8	(8)	1	8.33%
9	(9)	2	16.67%
N/A	(0)	0	0.00%



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	5.58	2.43	5.50	764	7.22	2.11	8.00	13519	7.16	2.10	8.00

Course: MATH-112-6: Calculus II - Spring 2020

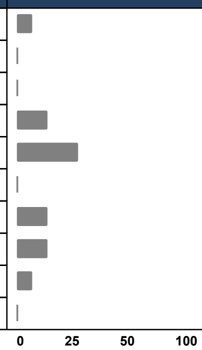
Instructor: Maryam Khaqan *

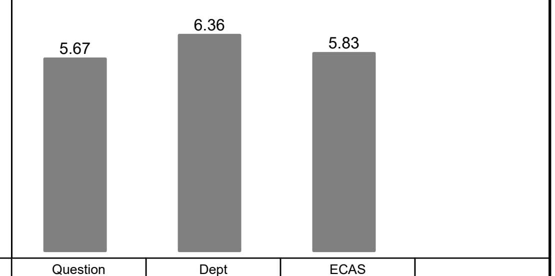
Response Rate: 12/16 (75.00 %)

12 - Answer each of the following questions about the remote learning portion of this course, in comparison with the on-campus portion of the course, with '1' representing "Much less effective," "Useless," or "Light workload," while '9' represents "Very effective," "Very Useful," or "Heavy workload."

course workload during remote learning (1=light, 9=heavy)

Response Option	Weight	Frequency	Percent
1	(1)	1	8.33%
2	(2)	0	0.00%
3	(3)	0	0.00%
4	(4)	2	16.67%
5	(5)	4	33.33%
6	(6)	0	0.00%
7	(7)	2	16.67%
8	(8)	2	16.67%
9	(9)	1	8.33%
N/A	(0)	0	0.00%





Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	5.67	2.23	5.00	764	6.36	1.98	7.00	13519	5.83	2.10	6.00

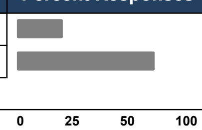
13 - What approach used in this course during the remote learning period was most effective in helping you achieve the stated learning objectives of the course?

Response Rate	2/16 (12.5%)

- The lectures worked well the "white board" and desmos worked well.
- The same approach before the remote learning period began. The only major difference to this course was that we were online, nothing else.

14 - Did you experience any technological difficulties during the course?

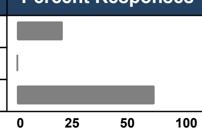
Response Option	Weight	Frequency	Percent
YES	(1)	3	25.00%
NO	(2)	9	75.00%



Response Rate
12/16 (75.00%)

15 - Were these difficulties easily resolved?

Response Option	Weight	Frequency	Percent
YES	(1)	3	25.00%
NO	(2)	0	0.00%
N/A	(0)	9	75.00%



Response Rate
12/16 (75.00%)

16 - Please tell us a bit about these difficulties (what precisely was unclear, difficult, or impossible; what tools or systems seemed to be involved; how frequently the problem arose or how long it persisted, etc).

Response Rate	2/16 (12.5%)

- Bad wifi at home
- Sometimes the wifi at my house would go out and it would be difficult to finish assignments but it was overall okay.

Course:	MATH-112-6: Calculus II - Spring 2020
Instructor:	Maryam Khaqan *
Response Rate:	12/16 (75.00 %)

17 - Please comment on the strengths and weaknesses of the course.

Response Rate	12/16 (75%)

- Everything was clearly laid out, but it seemed like the toughest subjects got so little time while we would waste time in class going over easy examples.
- The lectures were easy to understand and I thought the concepts were well explained. However, I thought that the WebAssign homework was a little harder than what was presented in class, but it wasn't a big problem.
- The course really strengthens integration skills picked up in earlier calculus classes, however the section on series was heavy and confusing.
- This course was definitely very challenging yet fair. I struggled most on the quizzes just because they were right after learning a material, leaving not much room for me to truly understand it.
- Math exams were ridiculously hard!! Also the class shouldn't have combined all of chapter 11 on one exam- that was a lot of information.
- Strengths: covers a wide range of material.
- I took this course because I had to
- Strengths: Quizzes and in class activites were extremely helpful in learning the course material Weaknesses: Summary exercises
- The material is rough and the weekly quizzes only add to the stress.
- It's following the textbook too much, making it predictable and easy. But since it's a special, high stressful time, why not?
- the math knowledge from this class is fundamental yet useful./ the pace is too fast sometimes
- I feel that in terms of when the material is presented to us, polar coordinates being at the end of the course is weird to me since it does not interact much with the other topics we learned. Other than that I think that the pacing of the class and how the material is presented works.

18 - Please comment on the strengths and weaknesses of the instructor.

Maryam Khaqan

Response Rate	12/16 (75%)

- She is very enthusiastic about math, but that is basically it. She teaches based off the assumption that you know 100% of everything taught beforehand, so if you miss one thing, you're done for the rest of the course.
- She was nice and taught the lectures well. I just wasn't used to a math class being quite interactive so it personally wasn't the type of class I liked. But I don't think the instructor did anything wrong, just not for me.
- Maryam is polite and approachable when there are questions, but I do not feel that some group work was necessary.
- I always had class during her scheduled office hours, but she was always very accommodating and helpful when I came for appointments.
- She was very accessible, nice, and organized, but I just feel she didn't provide enough examples in class.
- Had a hard time engaging the students. Spoke pretty well and went through material thoroughly.
- She was good at explaining questions and concepts
- Strengths: Explained all course material at a very reasonable pace. Did not rush anything. Answered all questions both in person and through emails. Very easily accessible to meet in her office if required Weaknesses: Summary exercises
- It was not a good class and the for such difficult topics a more seasoned professor would have been useful.
- She's hard working Follows the textbook too much
- The second half of the semester is great; for the first half, I think perhaps she can give more examples
- Professor Khaqan encourages collaborative learning which I do enjoy for this course as it helps to have multiple views for attempting a new concept.

19 - Would you recommend this course to another student? Why or why not?

Response Rate	12/16 (75%)

- Yes, but it is a very challenging class, especially when you get to series.
- Yes, I think it's useful to learn about calculus and it's not too difficult to learn in my opinion.
- No, I would not unless it was for their major requirement.
- Yes, for someone who likes math it is a nice step up from just calc I with new challenges.
- Yes
- Yes. Solid math course that covers a wide range of topics. Good for people who are interested in math.
- Only if you need to take it
- If you have interested in math you should definitely take this course. It does get hard but is very enjoyable.
- Only if they have a really solid foundation with Calc.
- This is a required course for higher math, so take it if you must
- maybe, depends if he/she is interested in math
- I think it's a good course to take to strengthen your knowledge of calculus. I enjoyed the material as it further builds on principles learned in Calc 1. I really only recommend it for people that need it as a prerequisite or for their major.

Course: MATH-112-6: Calculus II - Spring 2020

Instructor: Maryam Khaqan *

Response Rate: 12/16 (75.00 %)

20 - Would you recommend this instructor to another student? Why or why not?	
Maryam Khaqan	
Response Rate	12/16 (75%)

- Maybe, I don't know many other calc 2 people, but I had Brad Elliot in 111 and he was fantastic.
- I would recommend this instructor if the student likes a more hands-on learning experience with math. If the student just likes to write notes while the teacher writes on the board, however, I'd say don't take this instructor.
- Yes because you can always come to her when you are confused.
- Yes, I think she was engaging with the material.
- No because there are other professors
- Yes. Knew what she was talking about.
- Yes because she is good at explaining things
- Yes. She explained the concepts very well and I had no problems getting any of my doubts answered
- No, not at the moment.
- Not bad
- yes, overall a great teacher
- Yes, she's very willing to help her students as long as they're willing to put in the work. She makes time to answer students' questions and help them during Office Hours.

21 - Please reflect on the teaching of this course.What were the strengths of the instructors teaching?	
Response Rate	12/16 (75%)

- She would write out all the problems and do them with us.
- The strengths were that she was very engaged and was happy to teach the students topics that they didn't understand.
- she knew the content well
- I liked the lecture style of this class.
- she was very accessible and would answer your questions well. also she would always answer my emails quckly which is very helpful
- Good lectures with class notes and worksheets.
- Very clear
- - Pace at which material was covered - Easy accessible
- She honestly tried to make the class interesting but, practice is needed.
- Goes through all the required concepts
- she cares a lot for students who may not be doing that good in class
- Encouraging collaboration helped me a lot. I also liked her giving more than one example for topics.

22 - Please reflect on the teaching in this course.What could the instructor change to help you learn better?	
Response Rate	12/16 (75%)

- Take her time with things like series and brush over easier concepts
- I'm not exactly sure. Maybe go over more practice problems in class?
- Posting solutions to worksheets and study guide because what's the point of having and completing a study guide if you can't check and see that the work you did was right.
- Hand out more worksheets to help us prepare better for assessments.
- provide more examples
- Nothing really. Class engagement could've been better but that might've been partial because of the students.
- finish problmes put on the board
- Remove summary exercises. They do not fulfil the role they are set out to fill and cause unnecessary stress
- No more summary exercises.
- She can let everyone talk more, because I doubt if half the class understand what she talks about in lectures
- I would recommend more preparation
- I would like to have a worksheet or something to help with the basics of new topics. That would be more helpful to me alongside taking notes on examples.

Course:	MATH-112-6: Calculus II - Spring 2020
Instructor:	Maryam Khaqan *
Response Rate:	12/16 (75.00 %)

23 - Please reflect on the learning in this course.The instructor tried a number of ways to engage you with the material (Index Card Problems/Group Worksheets/Summary Exercises/In-class problems (that the instructor solved)/In-class Problems (that you had to solve) and Subsequent Discussions/EPASS worksheets). Which techniques were effective for you and how did they influence your learning of class material?

Response Rate	12/16 (75%)

- I did like the index card problems a lot
- I'd say the in class problems and group worksheets were the most helpful to me to learn more about the material. Personally, just doing more practice is what helps me to learn the material.
- In class problems that the instructor solved because I could go back and look at the steps she used to solve them.
- I think that the summary exercises were not effective and simply lowered my grade because we did not have much time to complete them.
- Index card problems and group worksheets are not helpful and confuse me more. and I feel that summary excercises were pointless and I never looked back at them
- They were all pretty helpful.
- in class problems
- Group worksheets were the most effective. Interacting with peers and learning how they go about tackling a problem provided valuable insights to how I could improve my problem solving abilities
- N/A
- None, I do my own s**t
- I think the methods she used are effective yet a little bit demanding for sometimes
- In class problems and worksheets always helped me so that I could put to test the formula that the new chapter teaches us. I also liked the index card problems a lot because they always seemed to be harder question that required us to use knowledge from previous units along with the current one.

24 - Please reflect on the learning of this course.The instructor used different methods to quiz you (In class quizzes/Group Worksheets/Short answers/WebAssign/Index Card Problems/Summary Exercises). How did that effect your studying/learning?

Response Rate	12/16 (75%)

- Webassign is just irritating as it sometimes doesn't reflect what we are even covering.
- I'd say all of the things listed above definitely helped me learn more about the material.
- Web Assign really helped my learning and studying but other methods were not so effective, they caused me more anxiety than anything else. Especially because the quizzes were timed at the beginning of class.
- The WebAssigns were very helpful, but I wish they were due the night before the quiz or test because I often found myself redoing the entire homework two days after it was due.
- web assigns really hard and in class quizzes were short timed but overall fine
- Quizzes were normal. Useful to tell what I know and need to work on.
- quizzes were good for studying
- Summary excercises were not helpful at all. The others helped me get a better and deeper understanding of the course material
- The index card problems were stressful after just learning a topic.
- It gives me stress but stress keeps me focused.
- good
- Summary exercises and index card problems allowed me to go back and learn the broad topic of each class before a quiz or test. In class quizzes just helped to make sure that the information we learned didn't go to waste, so having them, weekly helped my study schedule.

25 - Please reflect on the resources of this course. Please indicate use and usefulness and comment. Textbook. Used:

Response Option	Weight	Frequency	Percent	Percent Responses
Always	(3)	5	41.67%	
Some	(2)	6	50.00%	
Never	(1)	1	8.33%	
Response Rate	12/16 (75%)			

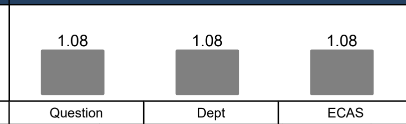
Course: MATH-112-6: Calculus II - Spring 2020

Instructor: Maryam Khaqan *

Response Rate: 12/16 (75.00 %)

26 - Please reflect on the resources of this course. Please indicate use and usefulness and comment. Textbook. Useful:

Response Option	Weight	Frequency	Percent
Yes	(1)	11	91.67%
No	(2)	1	8.33%



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	1.08	0.29	1.00	12	1.08	0.29	1.00	12	1.08	0.29	1.00

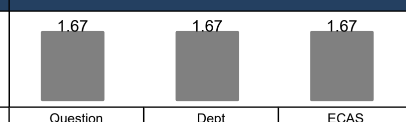
- for explaining concepts that were confusing in class
- Since the instructor repeats the textbook, I just read the textbook and don't listen to lecture that much.
- I like using the textbook when I needed further explanation on a subject that was already explained in class.

27 - Please reflect on the resources of this course. Please indicate use and usefulness and comment.EPASS. Used:

Response Option	Weight	Frequency	Percent
Always	(3)	0	0.00%
Some	(2)	2	16.67%
Never	(1)	10	83.33%
Response Rate	12/16 (75%)		

28 - Please reflect on the resources of this course. Please indicate use and usefulness and comment. EPASS. Useful:

Response Option	Weight	Frequency	Percent
Yes	(1)	4	33.33%
No	(2)	8	66.67%



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	1.67	0.49	2.00	12	1.67	0.49	2.00	12	1.67	0.49	2.00

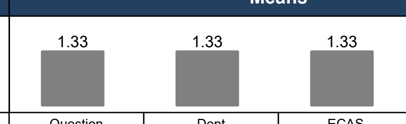
- n/a
- Good networking with upperclassmen
- I'm only saying no because I did not attend an EPass session for this course.

29 - Please reflect on the resources of this course. Please indicate use and usefulness and comment. WebAssign. Used:

Response Option	Weight	Frequency	Percent
Always	(3)	9	75.00%
Some	(2)	3	25.00%
Never	(1)	0	0.00%
Response Rate	12/16 (75%)		

30 - Please reflect on the resources of this course. Please indicate use and usefulness and comment. WebAssign. Useful:

Response Option	Weight	Frequency	Percent
Yes	(1)	8	66.67%
No	(2)	4	33.33%



Response Rate	Mean	STD	Median	Dept	Mean	STD	Median	ECAS	Mean	STD	Median
12/16 (75.00%)	1.33	0.49	1.00	12	1.33	0.49	1.00	12	1.33	0.49	1.00

- So tedious and irritating, if I wanted practice problems, they are in the book.
- The editor is so dumb. If I have anything wrong it doesn't tell me why and just shows it's wrong.
- I like WebAssign as a resource for my math courses.