Math 355: Real Analysis
Instructor: David Zureick-Brown ("DZB")

All assignments

Last updated: January 18, 2025

Gradescope code: DKNX3W

> **Show all work for full credit!**
>
> *Proofs should be written in full sentences whenever possible.*

Gradescope Instructions for submitting work in Math 355

You will be using the online Gradescope progam to submit your homework and exams. These instructions tell you how to sign up initially, and how to submit your written work.

Signing up for Gradescope the first time.

If you haven't used Gradescope for an **Amherst College** course before:

- Go to `http://www.gradescope.com`, click on "Sign up for free" (which may auto-scroll you to the bottom of the page), and select Sign up as [a] "Student".

- In the signup box:

  - Use the course entry code **DKNX3W**
  - Use your full name
  - Use your **Amherst College email** address. Or, if you are a Five-College student, use your email address from your own school.
  - Leave the "Student ID" entry blank.

- You will probably get an email asking to set a password for your account, so check your `amherst.edu` email inbox. (Or your email inbox through your own school, for Five-College students.)

Adding Math 355 to Gradescope.

If you **have** used Gradescope for an Amherst course before, and so you already have an account through your `amherst.edu` email, you still need to add Math 355, so:

- Go to `http://www.gradescope.com` and log in.

- Go to your Account Dashboard (click the Gradescope logo at upper left), and click "Add Course" at bottom right.

- Use the course code **DKNX3W**

Submitting written work

First write it out on paper as you would normally. Then **scan it** to create a PDF. One method for scanning is the smartphone app **DropBox**. It makes nice clear scans, and it saves them directly into a folder so that you can have all your assignments in one place. **CamScanner** is another free scanning App, and there are others, too. **Gradescope** now has its own scanning app. You can also use a printer/scanner if you prefer.

> **Please be kind to our dear graders and make sure your submission is legible !**
>
> *In particular, please leave some spacing between separate problems.*

If you have a tablet computer, you may write your work there (instead of on paper) and save it as a PDF.

Some of you may know the math formatting package LaTeX and may want to use it in Math 355. That's fine, too; if so, you may write up your work in LaTeX and save the resulting PDF.

In short, any method is fine as long as it creates a legible **PDF** file and **NOT a photo**.

For example, if you use the DropBox app, then in your created *Math 355 Homework* Dropbox folder, you can select create (+) at the bottom of the screen and click the *Scan Document* option. Snap a shot of the first page of your homework, and then click [+] to snap shots of any subsequent pages. Do **not** use the *Take Photo* option.

After you have scanned/saved your work as a PDF, submit it on Gradescope as follows:

- Go to `http://www.gradescope.com` and log in.

- Select the course "Math 355, Spring 2025" and the appropriate assignment.

- Select "submit pdf" to submit your work in PDF format. Browse to find your PDF and upload.

- Now it is time to **tag** your problems. This is an **important step**, where you are telling Gradescope which problems are on which page(s).

  For each problem, select the pages of your submission where your written solution appears.

  I think the easiest thing to do is to click on the page of **your** homework upload where you wrote the given problem, and then click on the assigned problem listed. Repeat for each problem.

  You must tag the problems or else you will not get credit for your work.

  Gradescope will give you a warning when you go to submit your assignment if you have not selected the pages correctly. If you tag a problem incorrectly, you can fix it by clicking "More" and "Reselect Pages".

- Click Save or Submit.

After your assignment is graded, you will be able to see your score on the written problems, along with comments, on Gradescope. You should receive an email notifying you when each homework set is graded.

Assignment 1: TBA

Due by 12:55pm, eastern, on Thursday, TBA

Suggested readings for this problem set:

- Syllabus: https://dmzb.github.io/teaching/thisYearthisSeasoncourseNumber/syllabus-math-courseNumber-spring-thisYe...pdf
- Gradescope instructions (previous page)
- Sections 1.1.1 and 1.1.2 and start 1.1.3. Here is a link to a pdf of the first few subsections of the book.

Suggested readings for this problem set: **TBA**
All readings are from Abbott, *Understanding Analysis*.

Assignment: due Thursday, TBA, 12:55pm, via Gradescope (DKNX3W):

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1. TBA

2. TBA

3. TBA

4. TBA

5. TBA

6. TBA

7. TBA

8. TBA

Assignment 2: TBA

Suggested readings for this problem set: TBA
All readings are from Abbott, *Understanding Analysis*.

Assignment: due Thursday, TBA, 12:55pm, via Gradescope (DKNX3W):

1. TBA

2. TBA

3. TBA

4. TBA

5. TBA

6. TBA

7. TBA

8. TBA

Assignment 3: TBA

Suggested readings for this problem set: TBA
All readings are from Abbott, *Understanding Analysis*.

Assignment: due Thursday, TBA, 12:55pm, via Gradescope (DKNX3W):

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1. TBA

2. TBA

3. TBA

4. TBA

5. TBA

6. TBA

7. TBA

8. TBA

Assignment 4: TBA

Due by 12:55pm, eastern, on Thursday, TBA

Suggested readings for this problem set: TBA

All readings are from Abbott, *Understanding Analysis*.

Assignment: due Thursday, TBA, 12:55pm, via Gradescope (DKNX3W):

1. TBA

2. TBA

3. TBA

4. TBA

5. TBA

6. TBA

7. TBA

8. TBA

Assignment 5: TBA

Due by 12:55pm, eastern, on Thursday, TBA

Suggested readings for this problem set: TBA
All readings are from Abbott, *Understanding Analysis*.

Assignment: due Thursday, TBA, 12:55pm, via Gradescope (DKNX3W):

1. TBA

2. TBA

3. TBA

4. TBA

5. TBA

6. TBA

7. TBA

8. TBA

Midterm 1 study guide

Take home exam, Thursday, TBA. Submit your exam via Gradescope.

The exam will be released at 2:15pm on Thursday, and will be due at 9:55am on Tuesday, October 22. The exam will be available on gradescope, and should be submitted via Gradescope.

The *types* of problems will include a subset of

1. Computations

2. Proofs

3. Algorithms

4. True False

5. Bonus problem

Problems with extremely long proofs or that involved some unusual trick will not be on the exam.

Since this is a take home exam, none of the problems will be identical to homework problems, but many problems will be minor variations of homework or of problems we worked in class.

A good way to prepare is to:

1. Know all of the definitions and terminology;

2. Know all of the statements of theorems, and examples of how we use the theorems;

3. Make a list of all of the different *proof techniques* from class and from the homework and review how those techniques are used in proofs and problems;

4. Practice doing problems "from scratch" and use your solutions as "hints" when you get stuck.

Additionally:

1. You are allowed to use the textbook, lecture notes and any materials from the course website.

2. Using Google or any other online resources is not always a reliable source. Please do not use Chat GPT or any other AI assistants.

3. You are allowed to use Theorems, lemmas, etc from the book or from class as part of your solutions, and you are not required to reprove these during the exam. Please do cite them (e.g., "Proposition 1.3.4 from our book") or refer to them by name, if they have a special name (e.g., "by the Matrix Tree Theorem").

4. Do not discuss the problems or their solutions with your classmates.

5. You can always ask me (the instructor) if you have clarifying questions, but asking for hints or asking if a proof is correct is not allowed.

A typical exam will have a few questions from each week of the course and will cover **assignments 1-4**. The problems will be similar to the homework problems, and the proofs will use the same techniques.

Assignment 6: TBA

Due by 12:55pm, eastern, on Thursday, TBA

Suggested readings for this problem set: TBA
All readings are from Abbott, *Understanding Analysis*.

Assignment: due Thursday, TBA, 12:55pm, via Gradescope (DKNX3W):

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1. TBA

2. TBA

3. TBA

4. TBA

5. TBA

6. TBA

7. TBA

8. TBA

Assignment 7: TBA

Due by 12:55pm, eastern, on Thursday, TBA

Suggested readings for this problem set: **TBA**

All readings are from Abbott, *Understanding Analysis*.

Assignment: due Thursday, TBA, 12:55pm, via Gradescope (DKNX3W):

1. TBA

2. TBA

3. TBA

4. TBA

5. TBA

6. TBA

7. TBA

8. TBA

Assignment 8: TBA

Due by 12:55pm, eastern, on Thursday, TBA

Suggested readings for this problem set: TBA
All readings are from Abbott, *Understanding Analysis*.

Assignment: due Thursday, TBA, 12:55pm, via Gradescope (DKNX3W):

1. TBA

2. TBA

3. TBA

4. TBA

5. TBA

6. TBA

7. TBA

8. TBA

Midterm 2 study guide

Take home exam, Week of TBA. Submit your exam via Gradescope.

The exam will be released at 9am on Sunday, Nov. 10, and will be due at 11am on Monday, Nov. 18. The exam will be available on gradescope, and should be submitted via Gradescope.

New request: if you are writing your exam in latex or on a tablet, please start each problem on a new page. (My eyes are not very good and this helps a lot when I am grading ≥ 50 exams.)

The *types* of problems will include a subset of

1. Computations

2. Proofs

3. Algorithms

4. True False

5. Bonus problem

Problems with extremely long proofs or that involved some unusual trick will not be on the exam.

Since this is a take home exam, none of the problems will be identical to homework problems, but many problems will be minor variations of homework or of problems we worked in class.

A good way to prepare is to:

1. Know all of the definitions and terminology;

2. Know all of the statements of theorems, and examples of how we use the theorems;

3. Make a list of all of the different *proof techniques* from class and from the homework and review how those techniques are used in proofs and problems;

4. Practice doing problems "from scratch" and use your solutions as "hints" when you get stuck.

Additionally:

1. You are allowed to use the textbook, lecture notes and any materials from the course website.

2. Using Google or any other online resources is not always a reliable source. Please do not use Chat GPT or any other AI assistants.

3. You are allowed to use Theorems, lemmas, etc from the book or from class as part of your solutions, and you are not required to reprove these during the exam. Please do cite them (e.g., "Proposition 1.3.4 from our book") or refer to them by name, if they have a special name (e.g., "by the Matrix Tree Theorem").

4. Do not discuss the problems or their solutions with your classmates.

5. You can always ask me (the instructor) if you have clarifying questions, but asking for hints or asking if a proof is correct is not allowed.

A typical exam will have a few questions from each relevant week of the course and will cover **assignments 5-7**.

Assignment 9: TBA

Due by 12:55pm, eastern, on Thursday, TBA

Suggested readings for this problem set: TBA

All readings are from Abbott, *Understanding Analysis*.

Assignment: due Thursday, TBA, 12:55pm, via Gradescope (DKNX3W):

1. TBA

2. TBA

3. TBA

4. TBA

5. TBA

6. TBA

7. TBA

8. TBA

Assignment 10: TBA

Due by 12:55pm, eastern, on Tuesday, 10

Suggested readings for this problem set: TBA
All readings are from Abbott, *Understanding Analysis*.

Assignment: due Thursday, TBA, 12:55pm, via Gradescope (DKNX3W):

1. TBA

2. TBA

3. TBA

4. TBA

5. TBA

6. TBA

7. TBA

8. TBA

Assignment 11: TBA

Due by 12:55pm, eastern, on Tuesday, TBA

Suggested readings for this problem set: TBA
All readings are from Abbott, *Understanding Analysis*.

Assignment: due Thursday, TBA, 12:55pm, via Gradescope (DKNX3W):

1. TBA

2. TBA

3. TBA

4. TBA

5. TBA

6. TBA

7. TBA

8. TBA

Final exam study guide

Final exam is a take home exam, released at **11:59pm** (evening) on **Wednesday, December 11** and due **Wednesday, December 18 at 4pm**.

The exam will be available on gradescope, and should be submitted via Gradescope.

Big request: if you are writing your exam in latex or on a tablet, please start each problem on a new page. (My eyes are not very good and this helps a lot when I am grading ≥ 50 exams.)

The **last day of class** is Tuesday, December 10.

The *types* of problems will include a subset of

1. Computations

2. Proofs

3. Algorithms

4. True False

5. Bonus problem

Problems with extremely long proofs or that involved some unusual trick will not be on the exam.

Since this is a take home exam, none of the problems will be identical to homework problems, but many problems will be minor variations of homework or of problems we worked in class.

A good way to prepare is to:

1. Know all of the definitions and terminology;

2. Know all of the statements of theorems, and examples of how we use the theorems;

3. Make a list of all of the different *proof techniques* from class and from the homework and review how those techniques are used in proofs and problems;

4. Practice doing problems "from scratch" and use your solutions as "hints" when you get stuck.

Additionally:

1. You are allowed to use the textbook, lecture notes and any materials from the course website.

2. Using Google or any other online resources is not always a reliable source. Please do not use Chat GPT or any other AI assistants.

3. You are allowed to use Theorems, lemmas, etc from the book or from class as part of your solutions, and you are not required to reprove these during the exam. Please do cite them (e.g., "Proposition 1.3.4 from our book") or refer to them by name, if they have a special name (e.g., "by the Matrix Tree Theorem").

4. Do not discuss the problems or their solutions with your classmates.

5. You can always ask me (the instructor) if you have clarifying questions, but asking for hints or asking if a proof is correct is not allowed.

The exam will be **comprehensive**. A typical exam will have a few questions from each week of the course, and there will be more emphasis on content not covered on the midterms. The exam to be around 8-9 problems (some with multiple parts), and 2-3 bonus questions.

Hints

X.X. No hints yet.