

MATH 5a: Precalculus

Summer 2026

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Every year that I spend in the company of mathematics, I learn new styles of thought, new ways to use that nifty all-purpose tool inside the skull: How to master a game by fussing with its rules. How to save thoughts for later, by recording them in loopy Greek symbols. How to learn from my errors as if they were trusted professors. And how to stay resilient when the dragon of confusion comes nibbling at my toes.

In all these ways, mathematics is an action of the mind.

– Ben Orlin

frankensine(θ) = an unholy combination of trig functions stitched together into a horrifying whole



13 Trig Functions you need to Memorize Right Now

Meeting Times & Locations (in Eastern Daylight Time, GMT-4):

Math 5a-1 will meet **M/T/W/Th, 9 am – 11 am Eastern on zoom**

The final is Thursday, August 6th, **9 am – noon**.

This class will be **online**. You will need working internet and a working video camera that can connect to zoom. Please reach out if this is problematic.

Course Description:

The main goal of this course is for you to acquire the tools you need to succeed in your future math and science courses. This includes not only calculation skills and how to apply these calculations to scenarios from science and economics, but also how to read math, how to study for a math exam, how to work together to solve problems, and how to harness your personal strengths for maximum efficiency in learning. The course is also designed to help you gain control over your own learning, which should help you to feel more confident in your math skills.

I have another goal for this class, which is to share my love of this material with you. I hope you will join me in taking great delight in all the wonderful surprises and deep connections that arise throughout this course.

Learning Goals for Math 5a:

1. Enter Math 10a (and other science, econ, psych, etc. classes) with *stronger* numeracy/precalculus skills than the average student.
2. Transfer familiar concepts to unfamiliar contexts, including applying math skills and knowledge to real-world applications.
3. Hone problem solving skills.
4. Develop and leverage a learning community for math.

Prerequisite:

We strongly recommend taking our online placement test, both for a recommendation on which class is the best fit for you and to identify any skills or ideas you need to review before the semester starts.

<https://communities.brandeis.edu/course/view.php?id=5642>

Brandeis Moodle:

All course materials will be available online on Brandeis Moodle: <https://moodle.brandeis.edu/my/courses.php>.

Texts:

- *Modeling, Functions, and Graphs: Algebra for College Students*, Brooks Cole, Yoshiwara and Yoshiwara, 4th edition.
<https://yoshiwarabooks.org/mfg/frontmatter.html>
- *Algebra and Trigonometry*, OpenStax CNX, Abramson, Jun 25, 2018.
<https://tinyurl.com/y7vku8bx>

Both texts are freely available online, though you can purchase print versions if you prefer.

Sections Covered:

Readings from the Yoshiwara text are labelled with a **Y** and readings from the Abramson text are labeled with an **A**.

Factoring

- A** Section 1.5 Factoring Polynomials
- Y** Section 6.1 Factors and x -Intercepts
- Y** Section 6.2 Solving Quadratic Equations

Trigonometry

- A** Section 7.1 Angles
- A** Section 7.2 Right Angle Trigonometry
- A** Section 7.3 The Unit Circle
- A** Section 7.4 The Other Trig Functions
- A** Section 8.1 Graphs of the Sine and Cosine Functions
- A** Section 8.2 Graphs of the Other Trig Functions
- A** Section 9.5 Solving Trigonometric Equations

Functions and Graphs

- Y** Section 1.1 Linear Models
- Y** Section 1.2 Functions
- Y** Section 1.3 Graphs of Functions
- Y** Section 1.4 Slope and Rate of Change
- Y** Section 1.5 Linear Functions

More on Functions

- Y** Section 2.1 Nonlinear Models
- Y** Section 2.2 Some Basic Functions
- Y** Section 2.3 Transformations of Graphs
- Y** Section 2.4 Functions as Mathematical Models
- Y** Section 2.6 Domain and Range

Power Functions

- Y** Section 3.1 Variation
- Y** Section 3.2 Integer Exponents
- Y** Section 3.3 Roots and Radicals
- Y** Section 3.4 Rational Exponents

Exponential Functions and Logs

- Y** Section 4.1 Exponential Growth and Decay
- Y** Section 4.2 Exponential Functions
- Y** Section 4.3 Logarithms
- Y** Section 4.4 Properties of Logarithms
- Y** Section 4.5 Exponential Models

Logarithmic Functions

- Y** Section 5.1 Inverse Functions
- Y** Section 5.2 Logarithmic Functions
- Y** Section 5.3 The Natural Base
- Y** Section 5.4 Logarithmic Scales

Inequalities

- Y** Section 6.5 Quadratic Inequalities

Polynomials and Rational Functions

- Y** Section 7.1 Polynomial Functions
- Y** Section 7.4 Graphing Rational Functions
- Y** Section 7.5 Equations That Include Algebraic Fractions

Note: Some topics may be added or omitted as time permits.

Class Structure:

Here's a calendar showing which sections we'll cover on which days: [class calendar](#)

New Content:

We will be covering new content on Tuesdays, Wednesdays and Thursdays. For each of these classes, we'll have:

- **Pre-class Preparation:** This will consist of videos (or, alternatively, you can read the textbook) and a short questionnaire that will ask you to briefly describe the main topics covered, solve a few problems similar to those demonstrated in the video/reading and ask a question. This work is essential for making the most of our in-class time.
- **Exercise Sets:** We'll work together in class on problem sets that build on the material covered in the Pre-class Preparation. These exercise sets are designed to help you build up from simpler to more sophisticated problems. Students may need to finish these Exercise Sets after class and will upload their completed work.
- **Data Analysis:** When we get to the end of certain chapters, we will work together as a class to apply our learning to analyze real-world data so we can see how our new skills and knowledge can be applied. Students will write up and submit their results.

Assessment:

On Mondays (except the first day) and during our assigned final period we will have assessments on the material covered the previous week. This is your chance to demonstrate what you have learned and test your knowledge. On each of these days we'll have:

- **Assessment:** We'll start with a traditional written assessment on material covered the previous week.
- **Review/Presentations:** Immediately after finishing the written assessment, we'll review it in groups. Individuals will have the opportunity to present corrected/improved solutions to the problems from the assessment for additional partial credit on the assessment.

Time on Task:

[Spending significant time studying and practicing](#) is absolutely essential to your learning and success in this course. You should expect to devote about **25 hours per week** to this four-credit class:

- **Class time \approx 8 hours per week:** We meet 2 hours each day for four days per week, so that's 8 hours of class time each week.
- **Pre-class Preparation \approx 4-5 hours per week:** You should expect to spend about 1-2 hours preparing for each of our "new content" days, which are Tuesdays, Wednesdays, and Thursdays.
- **Problem Sets and Data Analysis \approx 7-8 hours per week:** You should expect to spend about 2-3 hours finishing problem sets and/or doing your write up from our data analysis for each of our "new content" days, which are Tuesdays, Wednesdays, and Thursdays.
- **Studying for Assessments \approx 5 hours per week:** You should expect to spend about 5 hours each week preparing for our assessments. We'll provide one practice assessment that is structured like the actual assessment along with additional practice assessments for specific types of problems.

Grades:**Grade Components:**

- **Pre-class Preparation** – Each worth 5 points, graded on completion.
- **Problem Sets** – Each worth ~ 5 points (one point per page), graded on completion.
- **Data Analysis Write Ups** – Each worth 5 points, graded on completion.
- **Assessments – Graded on 4 point scale** There will be 5 assessments. Each problem will be graded on the same 4 point scale as used by the university for letter grades: The numerical equivalents of the grades are: A (A+) = 4.00; A-minus = 3.67; B-plus = 3.33; B = 3.00; B-minus = 2.67; C-plus = 2.33; C = 2.00; C-minus = 1.67; D-plus = 1.33; D = 1.00; D-minus = 0.67 and E = 0.00.

Grading Rubric for Assessments:

- **A range grades** To earn an A, your work must be complete and correct with correct notation (e.g., correct use of equal or inequality signs, correct parentheses, etc.) and organized logically.
- **B range grades** Work that earns a grade in the B range will be mostly correct and mostly complete. It may have some incorrect or missing notation and might be less logically organized than work earning an A but still demonstrates understanding of the material.
- **C range grades** Work that earns a grade in the C range might not be totally correct or complete, but will still demonstrate significant progress on the problem and understanding of the material. A C grade might result from missing or incorrect notation or disorganized or missing steps.
- **D range grades** Work that earns a grade in the D range indicates that some attempt towards solving the problem is shown but there is not significant progress toward the solution.
- **E grade** Essentially no work submitted.

Letter Grade:

At the end of the semester we will compute two scores:

1. **Completion Points Score:** This is simply a percentage of how many of the completion points you earned (for Pre-class Preparation, Problem Sets and Data Analysis Write Ups) out of the total possible points.
2. **Assessments Score:** As noted above, each Assessment will be graded on a 4 point scale. (The numerical equivalents of the grades are: A (A+) = 4.00; A-minus = 3.67; B-plus = 3.33; B = 3.00; B-minus = 2.67; C-plus = 2.33; C = 2.00; C-minus = 1.67; D-plus = 1.33; D = 1.00; D-minus = 0.67 and E = 0.00.) These will be averages to get one overall score on the same 4 point scale.

your letter grade will be calculated using the following table.

Letter Grade	Assessment Score	Completion Points Score
A+	> 3.8	$\geq 95\%$
A	> 3.67	$\geq 90\%$
A–	> 3.33	$\geq 90\%$
B+	> 3	$\geq 80\%$
B	> 2.67	$\geq 80\%$
B–	> 2.33	$\geq 80\%$
C+	> 2	$\geq 70\%$
C	> 1.67	$\geq 70\%$
C–	> 1.33	$\geq 70\%$
D+	> 1	$\geq 60\%$
D	> 0.67	$\geq 60\%$
D–	> 0.33	$\geq 60\%$

You do need to meet both conditions across the row to get the letter grade in the left column. For example, if you only have 78% of the completion points, you can only earn C+ even if your Assessment Score is 3.7. Similarly, if you have 96% of the completion points but your Assessment Score is 2.5, you would earn a B.

Resources to Help you Succeed

Study Hours:

This is time that I have set aside explicitly to answer questions and help you make the most of your study time. Please make use of this resource! You don't have to have questions prepared; you can just show up. See Brandeis Moodle for details.

Practice Assessments:

We will have Practice Assessments to help you prepare for each of our weekly assessment along with complete solutions. Pay attention to the amount of work shown, logical structure and notation in addition to whether you got the correct answer. We're looking for you to demonstrate your understanding of the process and reasoning.

Tutoring:

The university is planning to hire a tutor for the summer to assist students in Math 5a. This is an excellent resource. It can be really helpful to work with someone who recently learned the material you are learning.

Other Course Information

Calculators:

Calculators are **not** allowed during assessments. But you will sometimes need to have access to a graphing calculator during class or working on problem sets (an online one is fine, for example: <http://wolframalpha.com>).

Academic Honesty:

You are expected to be familiar with, and to follow, the University's policies on academic integrity. You are expected to be honest in all of your academic work. Please consult [Brandeis University Rights](#)

and [Responsibilities](#) for all policies and procedures related to academic integrity. Allegations of alleged academic dishonesty will be forwarded to Student Rights and Community Standards. Sanctions for academic dishonesty can include failing grades and/or suspension from the university. [Citation and research assistance](#) can be found on the [university library website](#).

If you have any questions, please contact Alex Rosett (arossett@brandeis.edu), Assistant Dean, Student Rights and Community Standards.

Accommodations:

Brandeis seeks to create a learning environment that is welcoming and inclusive of all students, and I want to support you in your learning. If you think you may require disability accommodations, you will need to work with Student Accessibility Support (SAS). You can contact them at 781-736-3470, email them at access@brandeis.edu, or visit the [Student Accessibility Support home page](#). You can find helpful student FAQs and other resources on the SAS website, including guidance on how to know whether you might be eligible for support from SAS.

If you already have an accommodation letter from SAS, please provide me with a copy as soon as you can so that I can ensure effective implementation of accommodations for this class. In order to coordinate exam accommodations, ideally you should provide the accommodation letter at least 48 hours before an exam.

Available Resources:

Many resources are available to help with the academic and non-academic factors that contribute to student success (finances, health, food supply, housing, mental health counseling, academic advising, physical and social activities, etc.). Please explore the links on the Support at Brandeis page <https://www.brandeis.edu/support/undergraduate-students/browse.html> to find out more about the resources that the University provides to help you and your classmates achieve success.

Timely communication:

Use your Brandeis email to reach out to me. I am usually able to respond quickly to most messages, within 24 hours, although during the weekends and over holidays it could take me longer. If I reach out to you, with a query or comment or in response to an email from you, I would appreciate it if you would acknowledge receipt of my message and/or respond with 24 hours, unless it is during weekend or over a holiday. Note that we will use your Brandeis email address, so you need to check it regularly.

All course announcements can be found in the [Course News & Announcements](#) page on Brandeis Moodle.

Name/Pronouns:

If your name and/or pronouns differ from those in your official Brandeis records, please let me know. You can call me Becci and I use she/her pronouns. Thanks!

About Me: Becci Torrey



My name is Becci. I was born in Chicago and have lived in New York, Washington, D.C., Vermont, London, and now Massachusetts. I work on math education at the collegiate level. I'm always happy to talk about it and I'm always looking for ways to improve your learning experience. When I'm not working on teaching, I'm dancing salsa. I am really looking forward to working with you this semester!