

MATH 001 Precalculus
MTWR 3:15 pm – 5:15 pm ICC 204B
Summer 2018

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Text: *Precalculus: A Right Triangle Approach*, 5th Ed.
by Beecher, Penna, and Bittinger (ISBN: 9780321969552)

Course description: This course reviews topics from high school algebra and trigonometry needed prior to the study of Calculus. It covers algebraic, graphical and numerical properties of functions, focusing on linear, quadratic, general polynomial, absolute value, rational, exponential, logarithmic, and trigonometric functions. Topics also include equations, inequalities, and complex numbers. Applications of mathematics to modeling real world situations are emphasized. We will cover the first eight chapters of the text (with a few omissions).

Learning Objectives:

1. Recognition of function model groups by name, equation, and general graph shape: quadratic, cubic, general polynomial, exponential, logarithmic, linear, rational, and trigonometric.
2. Vocabulary used to describe graphs: domain, range, increasing, decreasing, x-intercept, function zero, y-intercept, maximum, minimum, asymptote, vertical, horizontal, axis, scale, coordinates.
3. Real number line and solving inequalities to describe number sets on that line.
4. Develop a working knowledge of functions (linear, polynomial, exponential, logarithmic, and trigonometric) and brush up your algebraic skills in preparation for calculus. This includes developing an understanding of why the techniques and rules you learn are valid.
5. To be able to find patterns, make generalizations and conjectures, and construct arguments to justify claims.
6. To improve your problem-solving abilities and intellectual self-sufficiency; that is, the ability to rely on your own mathematical understandings to deduce new facts and devise new methods to solve unfamiliar problems.
7. To be able to construct and apply mathematical models of more or less realistic situations: to identify the relevant quantities and the relationships among them, represent them algebraically, solve the resulting mathematical problem, and interpret the results in the context of the original situation.
8. To communicate your reasoning and results to others.

Course Organization and Assignments:

1. **Lectures & In-Class Work** – Class time will largely be devoted to either lectures covering the material from the required text or group work on challenging problems. It is expected that you will attend every class. Attendance will be taken and students who are absent will not be able to receive credit for in-class work completed during their absence. Should circumstances necessitate your absence, it is your responsibility to communicate with your instructor and to take all necessary action to stay current with the course.

- 2. Homework** – Homework assignments will be due approximately once a week, typically on Mondays. See below for full details on homework.
- 3. Quizzes** – Quizzes will be given approximately twice a week. Students must be present in class to take the quizzes and no makeups will be given. See below for full details on quizzes.
- 4. Exams** – There will be two in-class exams and one final exam. Midterm exams will cover all the material from lectures, homework, and in-class work. The exact coverage for each midterm will be announced in advance of the exam. The final exam will be cumulative. For some exams, a formula sheet may be provided. The use of calculators, notes, or other reference materials during exams is prohibited. Dates for the exams are as follows:

Exam 1: 19 July (tentative)
Exam 2: 2 August (tentative)
Final Exam: 9 August, last day of course

Students are expected to be present for all examinations. If an unforeseen emergency (medical or otherwise) prevents you from being present during an exam, you must provide documented evidence of that event in order to take a makeup exam. Other reasons for missing an exam should be discussed as soon as possible (definitely prior to the exam) with the instructor and will be considered on an individual basis. A student who misses an exam without a valid, documented excuse or prior approval of the instructor will receive a score of zero on that exam.

- 5. Website** – Course materials (including this syllabus, homework assignments and due dates, and supplementary notes) will be posted to the course website on Canvas (<http://canvas.georgetown.edu>). Any announcements and updates will also be posted to this site.
- 6. Grading Scheme**
 - Homework and In-Class Work – 15%
 - Quizzes – 15%
 - Midterm Exams – 40% (20% each)
 - Final Exam – 30%

Assignment Details and Policies:

Quizzes: Approximately twice a week, there will be an in-class, closed-book, closed-note quiz. Each quiz will contain one or two problems related to previously given lectures and/or previously collected homework. The use of calculators or other electronic devices during these quizzes will be prohibited.

These quizzes may be given at any time during the class period and will not be announced in advance. If you are not present in class when the quiz is administered, you will receive a score of zero for that quiz. There will be **no extensions or makeups** on the quizzes for any reason. However, your lowest two quiz scores will be dropped when calculating semester grades.

Homework: Homework assignments will be due approximately once a week. Assignments will largely consist of problems from the textbook, but additional problems will occasionally be assigned. All

homework assignments and due dates will be posted to Canvas (<http://canvas.georgetown.edu>). Assignments are due at the beginning of class on the given due date. No late homework assignments will be accepted without prior approval of the instructor. The probability that you will be granted an extension is directly proportional to the amount of time between when you make your request and the original due date. That is, the earlier you ask, the more likely it is that your request will be granted.

In order to receive full credit for homework assignments, you must show all the work that led you to your solution. Correct answers without supporting work will not receive credit. When writing up your solutions, you should consider other students in the course as your intended audience. That is, you should write up your solutions with a sufficient level of detail so that another student in the course could read your solution and easily understand exactly how you solved the problem.

You are allowed (and encouraged!) to discuss homework assignments with other students. However, all submitted work must be your own. This means that you must independently write up your work and results. By submitting a homework assignment, you are certifying that you fully understand all the reasoning contained in your submission. It is expected that you would be able to reproduce that work upon request.

Homework Formatting and Grading Policies: Your homework assignments will sometimes be “spot graded,” meaning that a subset of the assigned problems will be selected for grading. The problems selected for grading will be chosen before any student submissions are reviewed. If you complete most, but not all, of the assigned problems, it is possible that you will get unlucky and receive an extremely low score on the assignment because you happened to skip all or most of the problems that were graded. (Of course, the opposite outcome is also possible – you could complete a small fraction of the assigned problems and get lucky in that you completed all the problems that were selected for grading.) In order to avoid this outcome, you should complete every assigned problem on every assignment.

All homework must be clearly labelled with your **name** and **assignment number**. Homework assignments which are not labelled with this information ***will not be graded and will receive no credit***. Your homework should be neatly assembled and organized. In particular, your writing must be neat and legible and your problems must be submitted in the same order as given in the assignment. If your writing on a graded problem is difficult or impossible for the grader to read, you will receive no credit for that problem. If you are unable to write legibly, you will need to type your assignments. If your problems are submitted out of order, you run the risk that the grader will believe you skipped a problem and you may not receive credit for your work. If your problems are submitted out of order, this type of “mistake” by the grader will not be considered a legitimate basis for a re-grade.

If you believe that there has been a mistake in the grading of your homework, you may bring that mistake to the attention of your instructor who will review the grading of that assignment.

Exams: All exams in this class are individual, closed-book exams which must be completed without the use of a calculator. The use of any electronic device (e.g., cell phones, pagers, tablets, calculators) or reference material (e.g., textbooks, class notes) during exams is strictly prohibited. Communication through any means (verbal, visual, written, or otherwise) with any individual other than the course instructor during exam is also prohibited.

Course Policies:

Email Policy: Any email sent to your instructor should be regarded as professional communication and should be composed as such. In particular, all emails should contain an appropriate greeting and ending as well as an identification of yourself and the class (including section number) about which you are writing. Emails should not contain texting abbreviations, acronyms, or slang. Emails that do not meet these standards may not be answered. Emails that do meet these standards will generally be answered within one business day. If you have not received a reply within one business day, please send another email to follow up. When following up, please send a new email in which you mention your previous email – do not simply resend the original email.

Record Keeping Policy: Grades for homework, quizzes, and exams will be posted to the course website. It is your responsibility to monitor your records and alert the instructor to any mistakes in a timely fashion. Any disputes about recorded grades should be addressed with the instructor within one week from the day on which an assignment was returned. All disputes about recorded grades *must* be addressed before the day and time of the final exam.

Standards of Conduct: As signatories to the Georgetown Student Pledge and as upstanding scholars and citizens, you are expected to adhere to the highest standards of academic honesty in all aspects of this course. As with all your courses, it is your responsibility to be familiar with and in compliance with the standards laid out by the Georgetown Honor Council, which are more fully explicated at <https://honorcouncil.georgetown.edu/> All instances of academic misconduct will be reported to and investigated by the Honor Council. Detailed expectations for this course are below.

Disability: If you have any type of disability (physical or mental, temporary or permanent) which interferes with the regular completion of course requirements, please inform your instructor with regard to the accommodations necessary to facilitate your success in this course. All reasonable requests for accommodations due to disability will be honored. Depending on the requested accommodation, you may need to obtain documentation of your disability and the necessity of your requested accommodation through the Academic Resources Center. See <https://academicsupport.georgetown.edu/disability> for further information.

Detailed Coverage:

The following sections of the textbook will be covered (dates of coverage and exams to be announced):

1. Graphs, Functions, and Models

- 1.1 Introduction to Graphing
- 1.2 Functions and Graphs
- 1.3 Linear Functions, Slope, and Applications
- 1.4 Equations of Lines and Modeling
- 1.5 Linear Equations, Functions, Zeros, and Applications
- 1.6 Solving Linear Inequalities

2. More on Functions

- 2.1 Increasing, Decreasing, and Piecewise Functions; Applications
- 2.2 The Algebra of Functions
- 2.3 The Composition of Functions
- 2.4 Symmetry

2.5 Transformations

3. Quadratic Functions and Equations; Inequalities

3.1 The Complex Numbers

3.2 Quadratic Equations, Functions, Zeros, and Models

3.3 Analyzing Graphs of Quadratic Functions

3.4 Solving Rational Equations and Radical Equations

3.5 Solving Equations and Inequalities with Absolute Value

4. Polynomial Functions and Rational Functions

4.1 Polynomial Functions and Models

4.2 Graphing Polynomial Functions

4.3 Polynomial Division; The Remainder Theorem and the Factor Theorem

4.4 Theorems about Zeros of Polynomial Functions

4.5 Rational Functions

4.6 Polynomial Inequalities and Rational Inequalities

5. Exponential Functions and Logarithmic Functions

5.1 Inverse Functions

5.2 Exponential Functions and Graphs

5.3 Logarithmic Functions and Graphs

5.4 Properties of Logarithmic Functions

5.5 Solving Exponential Equations and Logarithmic Equations

5.6 Applications and Models: Growth and Decay; Compound Interest

6. The Trigonometric Functions

6.1 Trigonometric Functions of Acute Angles

6.2 Applications of Right Triangles

6.3 Trigonometric Functions of Any Angle

6.4 Radians, Arc Length, and Angular Speed

6.5 Circular Functions: Graphs and Properties

6.6 Graphs of Transformed Sine and Cosine Functions

7. Trigonometric Identities, Inverse Functions, and Equations

7.1 Identities: Pythagorean and Sum and Difference

7.2 Identities: Cofunction, Double-Angle, and Half-Angle

7.3 Proving Trigonometric Identities

7.4 Inverses of the Trigonometric Functions

7.5 Solving Trigonometric Equations

8. Applications of Trigonometry

8.1 The Law of Sines

8.2 The Law of Cosines