Stony Brook University
Mathematics Department
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Introduction to Calculus
MAT 123
Fall 2012

Schedule

This is a tentative study plan. Please remember that **reading the textbook** and **doing exercises** are essential steps on the road of gaining mathematical knowledge. Be prepared to budget a considerable amount of time for doing math. Don't be scared if you'll meet difficulties: it's natural in the learning process. There are a lot of human **resources** available to help you: your lecturer and TA (during their office hours), and stuff in Math Learning Center.
For each week, several activities are assigned: Reading (sections in the textbook to be read before class meetings), Exercises (to be done before each recitation, solutions are in the textbook), and Homework (to be collected in the recitation next coming week).
Our textbook is **Sheldon Axler, Precalculus. A Prelude to Calculus**, Wiley.

Week of Aug. 27-31. Preliminaries: real numbers and real line. Numbers and variables. Arithmetic operations (addition, subtraction, multiplication, division) and their properties (commutativity, associativity, distributivity). Order of arithmetic operations. Algebraic expressions. Inequalities and intervals. Absolute value.

Functions: definition, domain and range. Graph of a function. Different ways to represent a function (by a formula, by a table, by a graph).

☞ Reading: 0.1, 0.2, 0.3, 1.1, 1.2.

✐ Exercises: 0.2: 5, 7, 11, 27, 33, 37
0.3: 7, 11, 15, 33, 37
1.1: 1-8, 15-26, 29, 45, 49
1.2: 19, 21-32.

✍ Homework: 0.2: 38; 1.1: 22, 30, 34, 48; 1.2: 20, 34, 44.

Week of Sep. 3-7 (no classes on Mon 9/3 and Tu 9/4). Graph transformations (shifting, stretching, reflecting). Even and odd functions. Composition of functions.

☞ Reading: 1.3, 1.4.

✐ Exercises: 1.3: 15, 17, 19, 21, 23, 25, 29, 35, 47, 49
1.4: 1, 3, 5, 7, 17, 25, 31, 35.

✍ Homework: 1.3: 16, 20, 24, 26, 30; 1.4: 2, 4, 6, 10, 18, 26, 32, 34.

Week of Sep. 10-14. One-to-one functions. Inverse functions and their graphs. Increasing and decreasing functions.

☞ Reading: 1.5, 1.6.

✐ Exercises: 1.5: 1, 3, 9, 11, 13, 15, 19, 31
1.6: 1, 3, 5, 7, 9, 11, 13, 15, 17, 25, 27, 29, 41, 43.

✍ Homework: 1.5: 2, 4, 6, 8, 16, 20, 30; 1.6: 6, 8, 10, 12, 14, 26, 28, 30, 46.

Week of Sep. 17-21. Linear functions and lines. Quadratic functions and parabolas.

☞ Reading: 2.1, 2.2.

✐ Exercises: 2.1: 3, 5, 11, 25, 31, 39, 45, 51
2.2: 9, 13, 21, 37, 40, 47, 50.

✍ Homework: 2.1: 4, 6, 12, 26, 32, 40; 2.2: 10, 14, 42, 51.

Week of Sep. 24-28. Power functions (integer, rational, real exponents). Polynomials. Rational functions (sketchy).

☞ Reading: 2.3, 3.1 (p. 224-229), 2.4, 2.5.

✐ Exercises: 2.3: 13, 19, 31, 37, 49
3.1: 17, 31, 35, 43, 49
2.4: 5, 11, 15, 27
2.5: 31, 39.

✍ Homework: 2.3: 20, 32, 38, 50; 3.1: 20, 34, 44, 48; 2.4: 6, 14, 16, 28; 2.5: 32, 40.

Week of Oct. 1-5. Exponential functions and their graphs. Algebraic properties of exponents.

☞ Reading: 3.1 (p. 230-232).

✐ Exercises: 3.1: 59, 63, 69, 71, 81.

✍ Homework: 3.1: 60, 62, 72, 80.

Week of Oct. 8-12. Logarithms as inverse functions for exponentials. Graphs of logarithmic functions. Algebraic properties of logarithms (inverse properties, product, quotient and power rules, change of base).

☞ Reading: 3.2, 3.3.

✐ Exercises: 3.2: 3, 11, 17, 27, 29, 39, 49, 59
3.3: 1, 3, 5, 9, 15, 19, 25, 29, 33, 47, 55.

✍ Homework: 3.2: 4, 12, 20, 28, 30, 40, 50, 60; 3.3: 10, 16, 30, 34.

Week of Oct. 15-19. Exponential growth and decay. Population growth, compound interest, radioactive decay. Richter magnitude scale and decibel scale for sound (if time allows).

☞ Reading: 3.4, 3.5.

✐ Exercises: 3.4: 15, 23, 25, 27
3.5: 3, 7, 9, 23.

✍ Homework: 3.4: 16, 24, 26, 28; 3.5: 4, 8, 10, 24.

Midterm 1 is on Wednesday, October 17th.

Week of Oct. 22-26. Areas of simple regions (square, rectangle, parallelogram, triangle, trapezoid). Area stretch theorem. Area inside a circle. Area inside an ellipse. Definitions of number e and natural logarithm.

☞ Reading: 4.2, 4.3.

✐ Exercises: 4.2: 11, 15, 35
4.3: 9, 13, 15, 21, 25.

✍ Homework: 4.2: 12, 16, 36; 4.3: 10, 14, 16, 22, 26.

Week of Oct. 29-Nov. 2. Exponential function with base e and natural logarithm, their graphs and algebraic properties. Approximations with e and ln. Application: continuously compounded interest.

☞ Reading: 4.3, 4.4, 4.5.

✐ Exercises: 4.4: 1, 7, 17
4.5: 1, 3, 9, 19.

✍ Homework: 4.4: 2, 8, 16; 4.5: 2, 4, 10, 20.

Week of Nov. 5-9. Angles and their measurements. The unit circle. Special angles. Length of an arc. Definition of cosine and sine.

☞ Reading: 5.1, 5.2, 5.3 (p. 383-387).

✐ Exercises: 5.1: 3, 15, 17, 19, 21, 23, 25, 27
5.2: 3, 5, 7, 11, 13, 15, 23
5.3: 1, 3, 5

✍ Homework: 5.1: 4, 16, 18, 20, 22, 24, 26, 28; 5.2: 4, 6, 8, 12, 14, 16, 24; 5.3: 2, 4, 6.

Week of Nov. 12-16. Trigonometric identities (fundamental trigonometric identity, cosine and sine of complementary and supplementary angles, periodicity). Tangent and cotangent, their properties. Secant and cosecant.

☞ Reading: 5.6, 5.3 (p. 388-391), 5.4.

✐ Exercises: 5.3: 21, 23
5.4: 3, 11
5.6: 1, 39, 43, 47, 51, 61.

✍ Homework: 5.3: 22, 24; 5.4: 4, 12; 5.6: 2, 40, 44, 48, 52, 62.

Week of Nov. 19-23 (classes only on Mon 11/19 and Tu 11/20). Right triangle trigonometry. Cosine, sine, tangent and cotangent as functions. Graphing cosine, sine, tangent, cotangent.

☞ Reading: 5.3, 5.4 (graphs), 5.5.

✐ Exercises: 5.5: 3, 19, 49.

✍ Homework: 5.5: 4, 18, 50.

Midterm 2 is on Monday, November 19th.

Week of Nov. 26-30. Graphing trigonometric functions: amplitude, period, phase shift.

☞ Reading: 6.5

✐ Exercises: 6.5: 1, 3, 9, 23, 45.

✍ Homework: 6.5: 2, 4, 10, 24, 46.

Week of Dec. 3-7. Review.

Final Exam is on Wednesday, December 12th 2:15pm-5:00pm.