18.01 | Fall 2006 | Undergraduate

Single Variable Calculus

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Readings

Listed in the table below are reading assignments for each lecture session.

“Text” refers to the course textbook: Simmons, George F. *Calculus with Analytic Geometry*. 2nd ed. New York, NY: McGraw-Hill, October 1, 1996. ISBN: 9780070576421.

“Notes” refers to the course reader: 18.01/18.01A Supplementary Notes, Exercises and Solutions; Jerison, D., and A. Mattuck. *Calculus 1*.

SES #	TOPICS	READINGS
	Derivatives	
0	Recitation: graphing	Notes G, sections 1-4.
1	Derivatives, slope, velocity, rate of change	Text 2.1-2.4.
2	Limits, continuity Trigonometric limits	Text: 2.5 (bottom pp. 70-73; concentrate on examples, skip the ε - δ definition) Text 2.6 to p. 75; learn definition (1) and proof “differentiable => continuous” at the end. Notes C
3	Derivatives of products, quotients, sine, cosine	Text 3.1, 3.2, and 3.4.
4	Chain rule Higher derivatives	Text 3.3 and 3.6.
5	Implicit differentiation, inverses	Text 3.5. Notes G, sections 5 Text 9.5 (bottom pp. 913 - 915)
6	Exponential and log Logarithmic differentiation; hyperbolic functions	Notes X (Text 8.2 has some of this) Text 8.3 to middle p. 267 Text 8.4 to top p. 271.
7	Exam 1 review	Text 9.7 to p. 326.
8	Exam 1 covering Ses #1-7	
	Applications of Differentiation	
9	Linear and quadratic approximations	Notes A
10	Curve sketching	Text 4.1 and 4.2.
11	Max-min problems	Text 4.3 and 4.4.
12	Related rates	Text 4.5.
13	Newton’s method and other applications	Text 4.6. (Text 4.7 is optional)
14	Mean value theorem Inequalities	Text 2.6 to middle p. 77. Notes MVT.
15	Differentials, antiderivatives	Text 5.2 and 5.3.
16	Differential equations, separation of variables	Text 5.4 and 8.5.

SES #	TOPICS	READINGS
17	Exam 2 covering Ses #8-16	
Integration		
18	Definite integrals	Text 6.3 though formula (4); skip proofs Texts 6.4 and 6.5.
19	First fundamental theorem of calculus	Text 6.6, 6.7 to top p. 215 (skip the proof pp. 207-8, which will be discussed in Ses #20.)
20	Second fundamental theorem	Notes PI, p. 2 [eqn. (7) and example] Notes FT.
21	Applications to logarithms and geometry	Text 7.1, 7.2, and 7.3.
22	Volumes by disks, shells	Text 7.4.
23	Work, average value, probability	Text 7.7 to middle p. 247. Notes AV.
24	Numerical integration	Text 10.9.
25	Exam 3 review	
Techniques of Integration		
26	Trigonometric integrals and substitution	Text 10.2 and 10.3.
27	Exam 3 covering Ses #18-24	
28	Integration by inverse substitution; completing the square	Text 10.4.
29	Partial fractions	Text 10.6. Notes F.
30	Integration by parts, reduction formulae	Text 10.7.
31	Parametric equations, arclength, surface area	Text 17.1, 7.5, and 7.6.
32	Polar coordinates; area in polar coordinates Exam 4 review	Text 16.1, (Text 16.2 lightly, for the pictures), Text 16.3 to top p. 570, and Text 16.5 to middle p. 581.
33	Exam 4 covering Ses #26-32	
34	Indeterminate forms - L'Hôspital's rule	Text 12.2 and 12.3. (examples 1-3, remark 1)
35	Improper integrals	Text 12.4. Notes INT.
36	Infinite series and convergence tests	Text pp. 439-442 (top), pp. 451-3 (skip proof in example 3), and pp. 455-457 (top).
37	Taylor's series	Text 14.4 through p. 498 (bottom); skip everything involving the remainder term R_n (x), 14.3-p. 490 (top) and examples 1-5.
38	Final review	
	Final exam	