

Chapter-by-Chapter Changes to Thomas14e

CONTENT ENHANCEMENTS

Chapter 1

- Shortened 1.4 to focus on issues arising in use of mathematical software and potential pitfalls. Removed peripheral material on regression, along with associated exercises.
- Clarified explanation of definition of exponential function in 1.5.
- Replaced \sin^{-1} notation for the inverse sine function with \arcsin as default notation in 1.6, and similarly for other trig functions.
- Added new Exercises: **1.1:** 59-62, **1.2:** 21-22; **1.3:** 64-65, **1.6:** 61-64, 79cd; **PE:** 29-32.

Chapter 2

- Added definition of average speed in displayed box in 2.1.
- Defined limits at interior and boundary points consistently with their treatment in multivariable domains later in the text.
- Reworded limit and continuity definitions to remove implication symbol and improve comprehension.
- Removed former Theorem 5, which is not used elsewhere.
- Added new Example 7 in 2.4 to illustrate limits of ratios of trig functions.
- Rewrote 2.5 Example 11 to solve the equation by finding a zero, consistent with previous discussion.
- Added new Exercises: **2.1:** 15-18; **2.2:** 3h-k, 4f-I; **2.4:** 19-20, 45-46; **2.5:** 31-32; **2.6:** 69-74; **PE:** 57-58; **AAE:** 35-38.

Chapter 3

- Clarified relation of slope and rate of change.
- Added new Figure 3.9 of square root function to illustrate vertical tangent line
- Added figure of $x\sin(1/x)$ in 3.2 to illustrate how oscillation can lead to non-existence of a derivative.
- Revised product rule to make order of factors consistent throughout text, including later dot product and cross product formulas.
- Added new Exercises: **3.2:** 36, 43-44; **3.3:** 65-66; **3.5:** 43-44, 61bc; **3.6:** 79-80, 111-113; **3.7:** 27-28; **3.8:** 97-100; **3.9:** 43-46; **3.10:** 47; **AAE:** 14-15, 26-27.

Chapter 4

- Added summary to 4.1.
- Added new Example 3 with new Figure 4.27 and Example 12 with new Figure 4.35 to give basic and advanced examples of concavity.
- Added new Exercises: **4.1:** 53-56, 67-70; **4.3:** 45-46, 67-68; **4.4:** 107-112; **4.6:** 37-42; **4.7:** 7-10; **4.8:** 115-118; **PE:** 1-16, 101-102; **AAE:** 19-20, 38-39. Moved exercises 4.1: 53-68 to PE.

Chapter 5

- Clarified discussion of the Mean Value Theorem and added new Figure 5.18 to illustrate it.
- Added new Exercises: **5.2:** 33-36; **5.4:** 71-72; **5.6:** 47-48; **PE:** 43-44, 75-76.

Chapter 6

- Clarified cylindrical shell method.
- Converted 6.5 Example 4 to metric units.
- Added introductory discussion of mass distribution along a line, with figure, in 6.6.
- Added new Exercises: **6.1:** 15-16; **6.2:** 49-50; **6.3:** 13-14; **6.5:** 1-2; **6.6:** 1-6, 21-22; **PE:** 17-18, 23-24, 37-38.

Chapter 7

- Clarified discussion of separable differential equations in 7.2.
- Added new Exercises: **7.1:** 61-62, 73; **PE:** 41-42.

Chapter 8

- Updated 8.2 Integration by Parts discussion to emphasize $u(x)v'(x) dx$ form rather than $u dv$. Rewrote Examples 1-3 accordingly.
- Removed discussion of tabular integration and associated exercises.
- Updated discussion in 8.5 on how to find constants in Partial Fraction method
- Updated notation in 8.8 to align with standard usage in statistics.
- Added new Exercises: **8.1:** 41-44; **8.2:** 53-56, 72-73; **8.3:** 75-76; **8.4:** 49-52; **8.5:** 51-66, 73-74; **8.8:** 35-38, 77-78; **PE:** 69-88.

Chapter 9

- Added new Example 3 with Figure 9.3 to illustrate how to construct a slope field.
- Added new Exercises: **9.1:** 11-14; **PE:** 17-22, 43-44.

Chapter 10

- Clarified the different meaning of a sequence and a series.
- Added new Figure 10.9 to illustrate sum of a series as area of a histogram.
- Added to 10.3 a discussion on the importance of bounding errors in approximations.
- Added new Figure 10.13 illustrating how to use integrals to bound remainder terms of partial sums.
- Rewrote Theorem 10 in 10.4 to bring out similarity to the integral comparison test.
- Added new Figure 10.16 to illustrate the different behavior of the harmonic and alternating harmonic series.
- Renamed the n th term test the “ n th term test for divergence” to emphasize that it says nothing about convergence.
- Added new Figure 10.19 to illustrate polynomials converging to $\ln(1+x)$, which illustrates convergence on half-open interval $(-1, 1]$.
- Used red dots and intervals to indicate intervals and points where divergence occurs and blue to indicate convergence throughout chapter 10.
- Added new Figure 10.21 to show the six different possibilities for an interval of convergence.
- Added new Exercises: **10.1:** 27-30, 72-77; **10.2:** 19-22, 73-76, 105; **10.3:** 11-12, 39-42; **10.4:** 55-56; **10.5:** 45-46, 65-66; **10.6:** 57-82; **10.7:** 61-65; **10.8:** 23-24, 39-40; **10.9:** 11-12, 37-38; **PE:** 41-44, 97-102.

Chapter 11

- Added new Example 1 and Figure 11.2 in 11.1 to give a straightforward first example of a parametrized curve.

- Updated area formulas for polar coordinates to include conditions for positive r and non-overlapping ϑ .
- Added new Example 3 and Figure 11.37 in 11.4 to illustrate intersections of polar curves.
- Added new Exercises: **11.1:** 19-28; **11.2:** 49-50; **11.4:** 21-24.

Chapter 12

- Added new Figure 12.13(b) to show the effect of scaling a vector.
- Added new Example 7 and Figure 12.26 in 12.3 to illustrate projection of a vector.
- Added discussion on general quadric surfaces in 12.6, with new Example 4 and new Figure 12.48 illustrating the description of an ellipsoid not centered at the origin via completing the square.
- Added new Exercises: **12.1:** 31-34, 59-60, 73-76; **12.2:** 43-44; **12.3:** 17-18; **12.4:** 51-57; **12.5:** 49-52.

Chapter 13

- Added sidebars on how to pronounce Greek letters such as kappa, tau, etc.
- Added new Exercises: **13.1:** 1-4, 27-36; **13.2:** 15-16, 19-20; **13.4:** 27-28; **13.6:** 1-2.

Chapter 14

- Elaborated on discussion of open and closed regions in 14.1.
- Standardized notation for evaluating partial derivatives, gradients, and directional derivatives at a point, throughout the chapter.
- Renamed “branch diagrams” to “dependency diagrams” which clarifies that they capture dependence of variables.
- Added new Exercises: **14.2:** 51-54; **14.3:** 51-54, 59-60, 71-74, 103-104; **14.4:** 20-30, 43-46, 57-58; **14.5:** 41-44; **14.6:** 9-10, 61; **14.7:** 61-62.

Chapter 15

- Added new Figure 15.21b to illustrate setting up limits of a double integral.
- Added new 15.5 Example 1, modified Examples 2 and 3, and added new Figures 15.31, 15.32, 15.33 to give basic examples of setting up limits of integration for a triple integral.
- Added new material on joint probability distributions as an application of multivariable integration.
- Added new Examples 5, 6 and 7 to Section 5.6.
- Added new Exercises: **15.1:** 15-16, 27-28; **15.6:** 39-44; **15.7:** 1-22.

Chapter 16

- Added new Figure 16.4 to illustrate a line integral of a function.
- Added new Figure 16.17 to illustrate a gradient field.
- Added new Figure 16.19 to illustrate a line integral of a vector field.
- Clarified notation for line integrals in 16.2.
- Added discussion of the sign of potential energy in 16.3.
- Rewrote solution of Example 3 in 16.4 to clarify connection to Green’s Theorem.
- Updated discussion of surface orientation in 16.6 along with Figure 16.52.
- Added new Exercises: **16.2:** 37-38, 41-46; **16.4:** 1-6; **16.6:** 49-50; **16.7:** 1-6; **16.8:** 1-4.

Appendices: Rewrote Appendix A7 on complex numbers.

