

Chapter 11

11.1–11.3. Two and three dimensional vectors: sum, scalar product, laws, determinants, dot product/cross product (computation and geometric interpretation—angles, perpendicularity, parallelism, areas, volumes), projections/components, computation.

11.4. Lines and planes: parameterizations, defining equations (vector and scalar), parallelism and angles, computation.

11.5–11.6. Curves in the plane and in space: parameterizations, continuity, differentiability and differentiation, tangent and unit tangent, arc length, reparameterizations, curvature (definition, interpretation, computation).

11.7. Surfaces in space: cylinders and quadric surfaces (qualitative understanding, matching).

11.8. Cylindrical and spherical coordinates: Only used for integration (see Chapter 13).

Chapter 12

12.1–12.3. Functions of several variables: basic definitions, limits, continuity (no proofs), level curves and surfaces (definitions, identifying).

12.4. Partial differentiation: definitions, computation.

12.6, 12.8. Linear approximations, gradients, directional derivatives (definitions, geometric interpretations, computations), tangent plane to the graph of a function and level surface of an equation (remember—they are different!), computation.

12.7. Multivariable chain rule in its various forms, computation.

12.5, 12.9, 12.10. Extreme values and optimization: vanishing/undefined gradient, boundary values, local extreme values (second derivative test: maxima, minima, and saddle points), lagrange multipliers, computation.

Chapter 13

13.1–13.5. Double integrals: definition, area and volume, iterated integrals, finding limits (horizontal/vertical simplicity), polar coordinates (radial simplicity), computation, applications (mass, center of mass, moment of inertia).

13.6–13.7. Triple integrals: definition, volume, iterated integrals, finding limits (x -, y -, and z -simplicity), cylindrical and spherical coordinates, computation, applications.

13.8. Surface area: parameterized surfaces, element of area on a parameterized surface, computation.

13.9. Change of variables: Jacobian, computation (don't forget about parallelograms...).

Chapter 14

14.1. Vector fields: Gradients, divergence and curl, computation, geometric interpretation, flows.

14.2–14.3. Line integrals: functions against arc length, 1-forms, vector fields, computation, work, fundamental theorem of calculus for line integrals, independence of path and conservative fields (potential functions), deciding if a field is conservative, computation, applications (mass, center of mass, moment of inertia).

14.4. Green's Theorem: statement, computation, corollaries, geometric/physical interpretation (flux) and relation to divergence.

14.5–14.6 Surface integrals and the divergence theorem: (make analogies with line integrals) functions against surface area, 2-forms, vector fields, applications, orientable surfaces, orientations, flux, divergence theorem, corollaries, geometric/physical interpretation, computation.

14.7. Stoke's Theorem: statement, relation to Green's Theorem, geometric/physical interpretations, conservative and irrotational fields, computation.