

It is advised that you

- Review the Lecture Notes.
- Work the first two tests (and the corresponding Review problems)
- Work quizzes.
- For topics you are struggling with, rework the associated webassign and suggested homework problems.
- Solve “Extra Practice” problems (notice that it doesn’t cover all the material).

Key Topics

- *Vector and parametric equations of a line; direction vector.*(11.4)
- *Equation of plane; normal vector; parallel planes; orthogonal planes; angle between two planes.*(11.4)
- *Quadric surfaces (standard equations of ellipsoids, paraboloids, cones and cylindric surfaces).*(11.5)
- *Space curve, tangent vector and tangent line.*(11.6)
- *Equation of a tangent plane to the graph of $z = f(x, y)$ (or, to a surface $z = f(x, y)$). Normal vector to this tangent plane.*(12.4)
- *Differential (applications: use differential to find an approximate value of an expression and to estimate the maximum error).*(12.4)
- *The Chain Rule (application: ”rate problem”).*(12.5)
- *Directional derivative, gradient and its significance (including maximum value of the directional derivative or maximum rate of change).*(12.6)
- *Local maximum and minimum values; critical point, saddle point, second derivatives test.* (12.7)
- *Absolute maximum and minimum values, extreme values theorem for functions of two variables* (12.7)
- *Evaluating double integrals, regions of types I and II.* (13.2,13.3).
- *Applications of double integral (volume (13.3), mass and center of mass of a lamina (13.6))*
- *Polar coordinates, conversion from rectangular to polar coordinates in a double integral* (13.4-13.5)
- *Triple integral and its applications (Volume and mass of a solid region (13.8))*
- *Triple integral in cylindrical coordinates* (13.9-13.10)
- *Triple integral in spherical coordinates* (13.9-13.10)
- *Line integral of a scalar function, mass of a thin wire with given linear density* (14.2)
- *Line integral of vector field* (14.2)
- *Work done by a force field* (14.2)
- *Conservative vector field, potential function (definition and how to find).* (14.3)
- *Fundamental Theorem for Line Integrals* (14.3)
- *Green’s Theorem* (14.4)
- *Independence of path* (14.3)
- *Curl and Divergence* (14.5)
- *Parametric surface and normal vector to it, tangent plane.* (14.6)
- *Surface area of a parametric surface and surface area of a graph $z = f(x, y)$.*(14.6)
- *Surface integral of a scalar function.*(14.7)

- *Surface integral of a vector field. (14.7)*
- *Stokes' Theorem (14.8)*
- *The Divergence Theorem (14.9)*
- *Any additional topic discussed in class*