

Covered Material and Resources for Part4 (Exam 3 - Final)

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1 November 7th - November 12th

Line Integrals around non-closed and closed paths. Conservative vector fields. Fundamental Theorem for Line Integrals. other references:

- Pauls notes: <http://tutorial.math.lamar.edu/Classes/CalcIII/LineIntegralsIntro.aspx>

2 November 12th - November 19th

Green's theorem for relating line integrals around simple closed curves to double integrals over planar regions bounded by the corresponding curve. Green's theorem is also useful for calculating area of planar regions. Gradient, Divergence and Curl operations. Test for conservative vector fields (check if $\nabla \times F = 0$). Finding the corresponding potential function f for a conservative vector field (i.e. find f such that $F = \nabla f$). Introduction to flux of a vector field. other references:

- Pauls notes: <http://tutorial.math.lamar.edu/Classes/CalcIII/GreensTheorem.aspx>

3 November 21st - December 12th

Surface Integration - integration of scalar functions and normal components of vector fields (for flux) over surfaces using projection techniques. See notes on main course site. Integration theorems of Vector Calculus. Gauss-Divergence theorem for calculating flux via divergence of a $2 - D$ vector field in planar regions. Stokes theorem, relating a surface integral of the normal component of the the curl of a vector field to a line integral of the vector field around the curve bounding the surface. By a curve bounding the surface we refer to a curve, such that if one travels along the curve in the positive (counterclockwise) orientation, then the surface will be to the left of the curve. Divergence theorem which relates the flux integral through a surface to a triple volume integral of the divergence of the vector field. Divergence theorem often helps to simplify surface flux calculations.

- Pauls notes: <http://tutorial.math.lamar.edu/Classes/CalcIII/CylindricalCoords.aspx>,
<http://tutorial.math.lamar.edu/Classes/CalcIII/DivergenceTheorem.aspx>

- Corral book: www.mecmath.net/calc3book.pdf