

NOTES ON THE SECOND HOUR EXAM-- 2014

The second hour exam will be held on Wednesday, April 16. As with all tests, it will be a closed note, closed book exam. Calculators and other electronic devices will not be allowed. I will provide a list of equations, results and formulae. The exam will cover :

- Vector calculus : Finding grad, div, curl in Cartesian and other coordinate systems; applying theorems of Gauss and Stokes; computing line integrals; determining whether forces are conservative; finding the scalar potential that generates a conservative force
- Orthogonal coordinates : Scale factors, unit vectors, determining expressions for the position vector in various coordinate systems; determining if a transformation is orthogonal; determining velocity and acceleration in orthogonal coordinate systems
- Series solutions of differential equation : finding recursion relations, determining coefficients and solutions to ODEs.
- Legendre series and polynomials : solving the Legendre differential equation, using generating functions to find recursion relations, expressing multipole potentials in terms of Legendre polynomials, expressing functions in Legendre series (series of Legendre polynomials)
- If there is a Mathematica problem, you will be asked to write a program to solve a differential equation (or coupled differential equations) using the Euler method and discretization techniques.