## NOTES FOR THE SECOND HOUR EXAM

## SPRING 2016

The second hour exam will be held on Friday, April 22. 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.

For the exam, you will be expected to:

• Use summation notation to prove and verify vector identities. If a problem asks for you to use summation notation, no credit will be given for an answer using explicit component notation.

• Finding grad, div curl in Cartesian and other coordinate systems.

• Use the divergence theorem and Stokes' theorem to compute integrals. Parameterize functions to compute line integrals in Cartesian and other coordinate systems.

• Determine if a force is conservative. Compute work done by a force. Use vector field theory to analyze a force.

• Use series solution techniques to find the recursion relation of an ODE, compute coefficients, and write out the first several terms of the power series solution.

• Solve Legendre' differential equation; compute Legendre polynomials, find Legendre series, use Legendre polynomials to express multipole expansions

• Write a *Mathematica* program employing Euler's method and recursion techniques to solve differential equations.