Math 241- Review Sheet for Midterm 3

The third midterm is on the last day of class, Thursday 12/10/15

Definitions/theorems to know:

- Definition of vector field
- Gradient vector field, conservative vector field, potential function
- Line integral of a function along a curve (p.1075 Def 2)
- Line integral of a vector field along a curve (to calculate work) (p.1083 Def 13)
- Fundamental Theorem for line integrals.
- Independence of path. Test for independence of paths (Thm 3,4 on p.1089)
- Test for conservative vector field (Thm 6 on p.1091)
- Green's Theorem, formulas for area that arise from Green's theorem.
- Curl, divergence, irrotational, incompressible
- Test for conservative vector field in R^3 (Thm 4 on p.1105)
- Parametric surface
- Formula for surface area (p. 1117)
- Surface integral of a function over a surface (p.1123 Eq 2)
- Surface integral of a vector field over a surface (to calculate flux) (p.1129 Eq 9)
- Stokes' theorem
- Divergence theorem.

Skills you should have:

- Sketch a vector field, recognize the sketch of more complicated vector fields.
- Calculate a line integral over a curve. This includes being able to successfully parameterize the curve, so maybe review 13.1. p. 1043 #1-14.
- Calculate the line integral of a vector field along a parameterized curve. Use this to calculate the work done by a variable force moving a particle along a curve in space. P. 1085 # 19-22, 29, 30, 39, 40, 41)
- Given a conservative vector field, find a potential function (p.1094 #3-10)
- Apply the fundamental theorem for line integrals to calculate work (p.1094 #12-18)
- Use Green's theorem to evaluate line integrals (p.11101 #5-14)
- Calculate curl and divergence of a vector field.
- Parameterize simple surfaces like spheres, cylinders, graphs of functions. (p.1120 #19-26)
- Calculate surface area of a parameterized surface. (p.1121 #39-40)
- Calculate the tangent plane to a parametrized surface. (p. 1121 #33-36).
- Evaluate a surface integral (p.1132 #5-20)
- Calculate flux using a surface integral (p.1132 #21-32)
- Verify Stokes' theorem in example (p.1139 #13-15)
- Apply Stokes' theorem in either "direction" (p. 1139 #2-6, 7-10)
- Verify Divergence Theorem in example(p. 1145 #1-4)
- Apply Divergence theorem to calculate flux (p. 1145 #5-15)

I highly recommend the end of chapter review exercises. For chapter 16 (p.1149) you should be able to do #1-19, 24-35). The summary in 16.10 is useful as well.