Final Exam Material

1. Classical Integration Theorems
   (a) Parameterizing curves
      i. Circles
      ii. Straight Lines
   (b) Setting up line integrals
   (c) Parameterizing surfaces
      i. Spheres
      ii. Cylinders
      iii. Planes
      iv. Graphs of functions $z = f(x, y)$
   (d) Setting up surface integrals
   (e) When and how to apply Green’s Theorem
   (f) When and how to apply Stoke’s Theorem
   (g) When and how to apply Divergence Theorem

2. Series Convergence and Sum
   (a) Summing geometric series
   (b) Summing telescoping series
   (c) Applying convergence tests to determine whether a series converges or diverges
   (d) Alternating Series
   (e) Absolute Convergence

3. Power Series and Fourier Series
   (a) Finding the interval of convergence of a power series
   (b) Deriving Maclaurin and Taylor series
   (c) Calculating Fourier series for functions defined on $[-π, π]$

4. PDE’s (with no Fourier analysis necessary)
   (a) Solving 1-d wave equation with given boundary and initial conditions
   (b) Solving 1-d heat equation with given boundary and initial conditions
   (c) Solving 2-d Laplace equation with given boundary conditions