MATH 223 University Calculus III Fall 2007
Review for Final Exam
The Top Ten Skills crucial to doing well on this exam

First, you should definitely expect to see problems on polar integration and triple integration, as covered in 15.4 and 15.7. I don’t think these will make up much more than 20% of the exam at most. With regard to triple integrals, you should be able to integrate over (a) Solids where the bounds for \( x \), \( y \), and \( z \) are explicitly stated, (b) rectangular prisms and tetrahedra whose bounding planes are specified, (c) More complicated solids only if provided with a diagram showing the solid and its bounding surfaces.

1. Calculate partial derivatives and gradients
2. Calculate iterated integrals
3. Find equations for lines and planes, including tangent planes
4. Apply the Second Derivatives Test to determine relative extrema of a function of two variables.
5. Compute arc length and curvature of curves
6. Use the Chain Rule to find derivatives
7. Compute dot and cross products, and use them to find quantities such as projections, areas, and volumes.
8. Convert double and triple integrals into iterated integrals
9. Find the average value of a function of two variables
10. Estimate a double integral using a double Riemann sum

Other important topics: Computing directional derivatives; finding absolute extrema of a function of two variables on a closed, bounded region; converting an integral to polar coordinates; polar integration; finding the angle between two vectors; showing that a limit of a function of two variables does not exist; describing level curves of a function of two variables; implicit differentiation

Not on there: Identifying quadric surfaces, finding distances between geometric objects (other than points!), Squeeze Theorem–finding limits

This is not meant to be an exhaustive list of everything that could be on the exam! (But, frankly, I think it’s pretty close!)