Math 205 Test 3 Preparation

1. The test covers chapter 15
2. The test will be based in large part on the homework and examples from class. So use these as a study guide.
3. **Memorize** the following formulas.

   a) Conversion identities for the various coordinate systems we've encountered.
   b) If $x = g(u,v)$ and $y = h(u,v)$, the **Jacobian** of of x and y with respect to u and v is given by

$$\frac{\partial(x, y)}{\partial(u,v)} = \begin{vmatrix} \frac{\partial x}{\partial u} & \frac{\partial y}{\partial u} \\ \frac{\partial x}{\partial v} & \frac{\partial y}{\partial v} \end{vmatrix} = \frac{\partial x}{\partial u}\frac{\partial y}{\partial v} - \frac{\partial y}{\partial u}\frac{\partial x}{\partial v}$$

   c) **Change of Variables for Double Integrals**: Let $T(u,v) = (x, y) = (g(u,v), h(u,v))$ be a one-to-one transformation that maps a region S in the uv-plane onto a region R in the xy-plane. Then, under certain conditions, $\iint\limits_{R} f(x, y)dxdy = \iint\limits_{S} f(g(u,v), h(u,v))\left|\frac{\partial(x, y)}{\partial(u,v)}\right|dudv$.

   d) Any formula or identity needed to do the homework (e.g. the power-reducing trigonometric identities.)
   e) Be able to recognize and write equations of cylindrical and quadric surfaces (see section 12.2).

4. Be very familiar with all theorems and definitions from the chapter (read over the lecture outlines several times if necessary).
5. A well-prepared student should be able to…
   a) evaluate an iterated integral.
   b) use an iterated integral to find the area of a plane region.
   c) represent the volume of a solid using a double integral.
   d) set up and evaluate a double integral as an iterated integral in both rectangular and polar coordinates.
   e) reverse the order of integration in a given iterated integral.
   f) find the mass of a planar lamina using a double integral.
   g) find the center of mass of a planar lamina using double integrals.
   h) find moments of inertia using double integrals.
   i) find the volume of a solid using a triple integral in rectangular, cylindrical, and/or spherical coordinates.
   j) set up and evaluate a triple integral in rectangular, cylindrical, and/or spherical coordinates.
   k) evaluate a double integral using a change of variables.
   l) solve homework-like problems.