REVIEW FOR TEST 1 OF CALCULUS III:

The first and best line of defense is to complete and understand the homework and lecture examples. Past that my old test might help you get some idea of how my tests typically look (although our course differs significantly in content, we do partial derivatives and skip almost all of section 14.3). Most of the test will be like problems you've done before, they may not be the same format but they should require the same skill set. There will be about 5% which is more challenging. The page numbers on this review refer to my course notes.

Analytic Geometry:
- -equations for the coordinate planes,
- -distance formula (238, E2 on 239),
- -equation of a sphere (E1 on 239),
- - equations of a cylinders,
- -equation of planes,
- -definition of graph of function of two variables (257),
- -intersections (E16 on 255)

Vectors:
- -as a directed line segment between points (240)
- - how to add and subtract both graphically and via component algebra (241)
- - be able to freely translate between the $< , , >$ formalisms and the $\hat{i},\ \hat{j},\ \hat{k}$ notation.
- - how to break up a geometrically described vector into its Cartesian components(244)
- - how to find angle between two vectors (E3 and E4 on 245)
- - how to find length of a vector (E3 on 245)
- - how to find a unit vector along the direction of some given vector (E3 on 245)
- - how to write any vector as a magnitude times a direction vector with unit length (242)

Dot Products:
- -how to calculate(247)
- -know the properties(243)
- -how to test if two vectors are perpendicular (end of E6 on 248)
- -how to find Cartesian components using dot products with $\hat{i},\ \hat{j},\ \hat{k}$.
- - meaning of dot product of $\vec{c}$ with $\hat{a}$
- - vector and scalar projections; know formulas for $proj_{\vec{B}}(\vec{A})$ and $comp_{\vec{B}}(\vec{A})$ (244)
- - know how to picture the projection geometrically.

Cross Products:
- -how to calculate(247)
- - know the properties(248)
- - how to find a vector which is perpendicular to a pair of given vectors.

Planes:

-vector description (254)
- Cartesian description(254)
- how to find equation given a the normal vector and a point
- how to find equation of plane given three points

Lines:

-vector-parametric description of line (251)
-be able to translate vector parametric to scalar parametric and vice-versa (251)
-meaning of direction or tangent vector
-equation of line segment (252)
-how to test if lines are parallel (E3 on 253)

Curves:

-be able to sketch or identify simple curves such as a line, helix or circle in a plane.
-be able to test for intersections of curves
-be able to find tangent line to curve at a point (E30 and E31 on 268)

Calculus for Vector-Valued Functions of a real variable (a.k.a. Space Curves):

-know how to differentiate a vector of functions (263, E26 and E27 on 264)
-know how to integrate a vector of functions (E26 on 264)
-know the various product rules and properties (265)
-be able to prove i, ii, iii, or iv. (I'll not ask v. or vi.)

Motion:

-be able to test if two particles will collide given their respective position functions.
-know how to find velocity, speed and acceleration given the position.
-know how to find the velocity and position given the acceleration and initial data.

Partial Derivatives:

-be able to state definitions for $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ for a function $f : U \subseteq \mathbb{R}^2 \to \mathbb{R}$. (292)

-be able to calculate examples like those on 293-294 (E49-E54)

-chain rules: know how to calculate for one or two independent variables and one, two or three intermediate variables. [see 296 rules 1,2,3 and 298 rules 5,6,7]. Do examples E55, E56, E57, E58, E59.

-we skip 300-305 for now.