Topics for final exam
Math 32, Fall 2015

The final exam will be comprehensive, and will therefore involve both the topics on this sheet and **all previous topics**. There will be a slight emphasis on the topics listed on this sheet, but everything we have covered is fair game.

Your first priority should be to understand the homework and the principles behind it. Besides the list below, you should also be familiar with everything specially emphasized in the text (i.e., the red boxes), and all the examples in the text. If time permits, try to do the example problems in the text by yourself.

You are allowed to use a calculator (not a TI-89 or TI-92) and notes on **ONE** 3×5 note card (both sides). (This really means **one** card, i.e., you can't just staple together your old cards.)

Section 15.7. Calculating triple integrals by calculating iterated integrals. Type I (integrate z first): bottom/top walls are functions $z = f_1(x, y)$, $f_2(x, y)$, then integrate over 2-D region in plane. Application: Integral of density is total mass, charge, etc.

Section 15.8. Cylindrical coordinates: Basic idea; conversion formulas $x = r\cos\theta$, $y = r\sin\theta$, $z = z$, fudge factor $r\,dr\,d\theta\,dz$.

Section 15.9. Spherical coordinates: Basic idea; conversion formulas $x = \rho\sin\varphi\cos\theta$, $y = \rho\sin\varphi\sin\theta$, $z = \rho\cos\varphi$, fudge factor $\rho^2\sin\varphi\,d\rho\,d\varphi\,d\theta$.

Section 10.1. Definitions: Parametric equations, parametric curve. Sketching parametric curves (arrows for direction of travel). Eliminating parameter to get Cartesian equation; interpreting direction of travel along Cartesian curve.

Section 13.1. Idea of a 3-D path/space curve. Vector function form of a space curve; parametric equations for a space curve. Graphing: pick-a-point method. Basic examples: lines, circles, ellipses, helices (a.k.a. helixes).

Section 13.2. Derivative of a vector function/space curve: how to compute $\mathbf{r}'(t)$, $\mathbf{r}''(t)$. Interpretation of $\mathbf{r}'(t)$ in terms of where to draw it, direction, magnitude.

Section 13.4. Computing/interpreting velocity, speed, acceleration. Getting velocity from acceleration, position from velocity.

Not on exam. (15.7) Three-variable moments, center of mass, moments of inertia. (10.1) The cycloid, families of curves. (13.1) Limit of a vector function; complicated examples (toroidal spiral, trefoil knot). (13.2) Differentiation rules. (13.4) Tangential and normal components of acceleration; Kepler's laws (pp. 866–869).