**Calc C Review for final**

Geometric entities in :

Lines: All forms

Surfaces: Planes, spheres, cones, cylinders, oids, quadrics

Know intersections of these, level sets, traces, etc.

Vectors:

Lengths

Algebraic operations

Products: dot/cross/scalar (with interpretations)

Vector Functions:

Of one variable:

Space curves

Derivatives

Tangent lines

Gradients

Parameterization of Surfaces

Vector Fields, including curl and div and gradients

Functions of several variables

Graphs

Partial derivatives, Clairout’s theorem

Gradients and directional derivatives

Vis-à-vis level curves and level surfaces

Direction of maximal increase

Tangent planes: Two ways

Multiple Integrals

2-D:

Over general regions

Polar coordinates

3-D:

Over general regions

Cylindrical coordinates

Spherical coordinates

Other types of integrals:

Line integrals

(Work integral)

Surface integrals

(Flux integral)

Applications:

Area

Volume under a graph

Volume of a 3D region

Average value

Mass/center of mass

Work

Arc Length\*

Surface area\*

Theorems of Vector Calculus

Fundamental Theorem for Line integrals (of Conservative Vector Fields)

1. Which is conservative
2. Find a potential function
3. Use FTLI to calculate a work integral

Green’s Theorem

Stokes’ Theorem

Divergence Theorem

1. State
2. Use the theorem to calculate LHS

Know statements of:

Fubini’s Theorem for double integrals over a rectangle

Green’s Theorem

Stokes Theorem

Divergence Theorem

Know definitions of:

Partial Derivatives

Directional Derivatives

where is a rectangle

**Not**:

Change of variables for double integrals

Projections:

Chain rule

Implicit differentiation