Exam Review (Exam is Friday, in class. Closed book & note. No graphing calculators allowed. I'll provide you with the book's integral tables – you should know basic integrals & method of substitution.)

Double & Triple integrals

- Riemann sums → integrals are limits of these, so understanding of what integrals mean (area, volume, mass, moments, etc.) is based on finite Riemann sums.

- Computing iterated integrals (by partial integration) (relatively "easy")

- Converting a description of a region into an "iteration", so that you can write down iterated integrals for functions defined on that region (and vise-verse!) (harder!)

- change of variables to polar, cylindrical, or spherical coords

Know
$dA = r\,dr\,d\theta$
$dV = r\,dr\,d\theta\,dz$
$dV = \rho^2 \sin\phi\, d\phi\, d\theta\, d\rho$

- applications
  - mass (2-d, 3-d regions); includes area & volume
  - center of mass (for 2-d, 3-d regions) (centroid)
  - moments of inertia (3-d regions)
  - Surface area (for surfaces in space)

Know all formulas

$A = \iint_R 1\,dA$, $V = \iiint_R 1\,dV$

$m = \iint_R \delta\,dA$ or $\iiint_R \delta\,dV$

$\bar{x} = \frac{1}{m}\iint x\,\delta A$ (or $\frac{1}{m}\iiint_R x\,dV$)

$\bar{y} =$

$\bar{z} =$

$I_z = \iiint_R (x^2+y^2)\,dV$

$A = \iint_{u\text{-}v \text{ region}} |\vec{X}_u \times \vec{X}_v|\,du\,dv$

for $\vec{X}\begin{pmatrix}x\\y\end{pmatrix} = \begin{bmatrix}x\\y\\f(x,y)\end{bmatrix}$

becomes

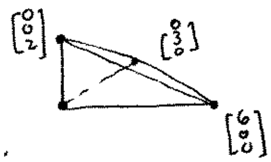
$A = \iint_{x\text{-}y \text{ region}} \sqrt{1+f_x^2+f_y^2}\,dx\,dy$

Sample test | Not inclusive!

1 a) Compute $\iint_R f\,dA$ if $f(x,y) = xy$ and R is the rectangle
$1 \le x \le 2$
$0 \le y \le 2$

b) Change limits (by first sketching region), and then evaluate $\int_0^4 \int_{\sqrt{y}}^2 \frac{y e^{(x^2)}}{x^3}\,dx\,dy$

2. Consider the pyramid in the first octant bounded by the three coord planes and the skew plane $x+2y+3z=6$
a) Find its volume with a triple integral
b) Find the x-coord of its centroid (assume density $\equiv 1$).



3. Let D be the disk of radius 2 centered at the origin. Find $\iint_D \frac{1}{1+x^2+y^2}\,dA$