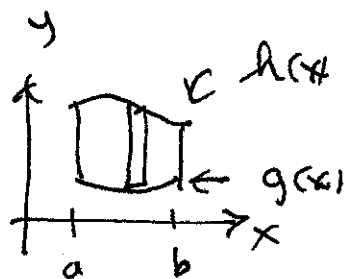


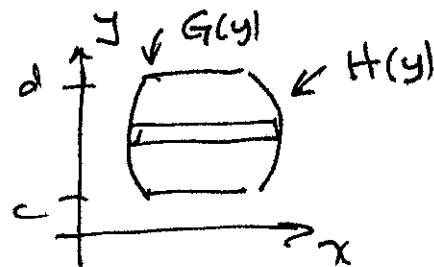
Math 2471 - Calc 3

Double integrals

$$\iint_R f(x,y) dA$$



or



$$\int_a^b \int_{g(x)}^{h(x)} f(x,y) dy dx$$

↑ curve to curve
pt to pt

or

$$\int_c^d \int_{G(y)}^{H(y)} f(x,y) dx dy$$

↑ curve → curve
pt → pt

Now we go to
triple integrals

$$\iiint_V f(x,y,z) dV$$

Now $dv = dx dy dz$

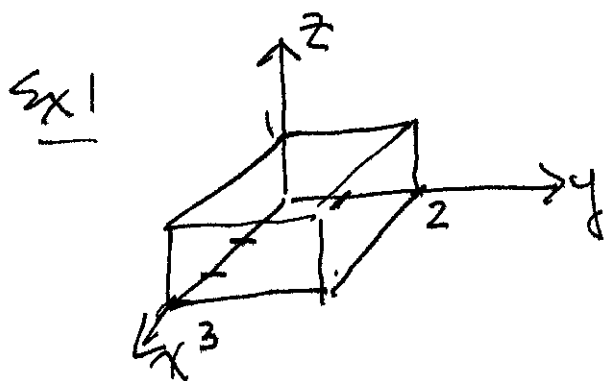
or any combination

$dy dx dz, dx dz dy, dz dx dy$

$dz dy dx, dy dz dx$

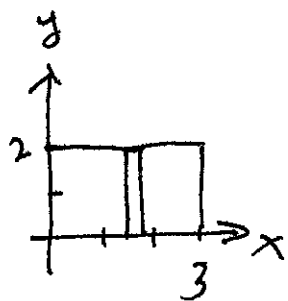
$$\int \int \int f(x, y, z) dv$$

$\uparrow$ surface to surface
 $\uparrow$ pt curve $\rightarrow$ curve
 $\uparrow$ pt $\rightarrow$ pt



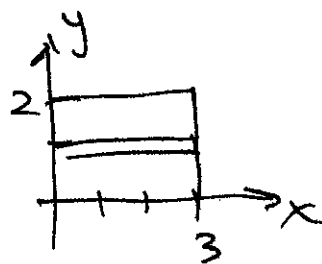
$$\iint_{R_{xy}} \int_0^1 f(x, y, z) dz dA_{xy}$$

Now next 2 $\iint$ ~~are~~ is a region in xy plane



$$\int_0^3 \int_0^2 \int_0^1 f dz dy dx$$

$x=0 \ y=0 \ 0$



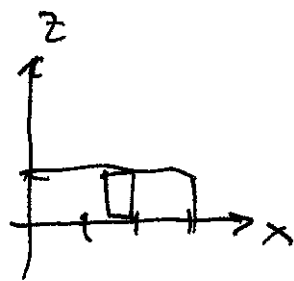
$$\int_0^2 \int_0^3 \int_0^1 f dz dx dy$$

$y=0 \ x=0 \ 0$

#2

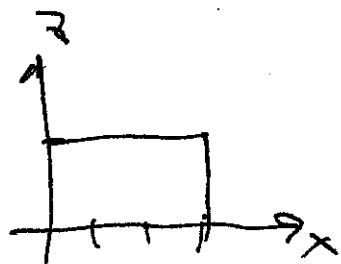
$$\iint_{R_{xz}} \int_0^2 f dy dA_{xz}$$

$y=0$



$$\int_0^3 \int_0^1 \int_0^2 f dy dz dx$$

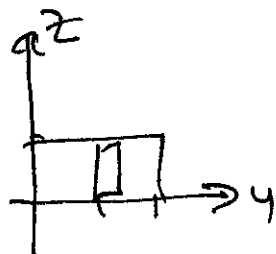
$x=0 \ z=0 \ y=0$



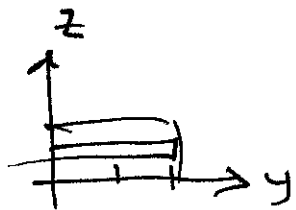
$$\int_0^1 \int_0^3 \int_0^2 f dy dx dz$$

$z=0 \ x=0 \ y=0$

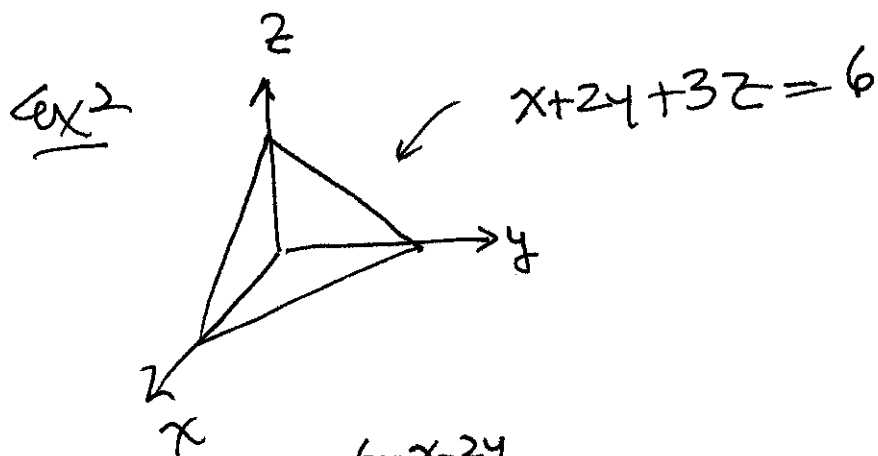
#3 $\iint_{R_{yz}} \int_{x=0}^3 f(x) dA_{yz}$



$$\int_{y=0}^2 \int_{z=0}^1 \int_{x=0}^3 f(x) dz dy$$

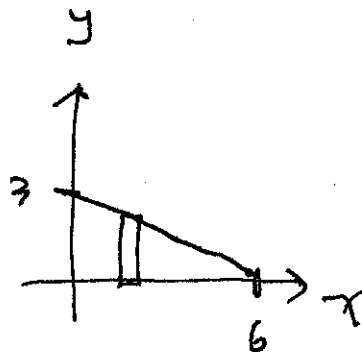


$$\int_{z=0}^1 \int_{y=0}^2 \int_{x=0}^3 f(x) dy dz$$

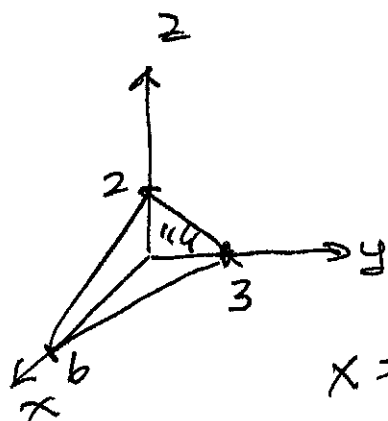


$z=0$
 $x+2y=6$

$$\iint_{R_{xy}} \int_{z=0}^{\frac{6-x-2y}{3}} f(z) dA_{xy}$$



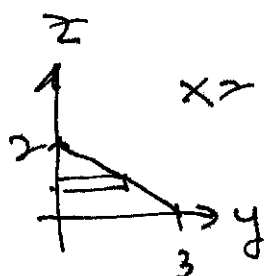
$$\int_0^6 \int_0^{\frac{6-x}{2}} \int_0^{\frac{6-x-2y}{3}} f(z) dz dy dx$$



Surface $\rightarrow$ Surface along x axis

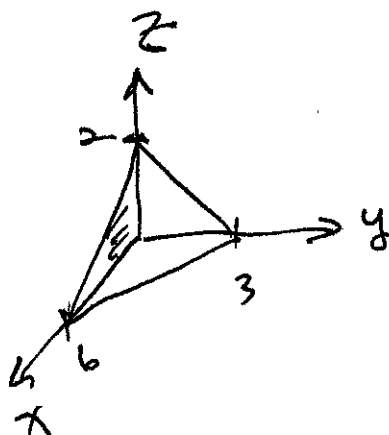
$$x=0 \rightarrow x = 6 - 2y - 3z$$

$$\iiint_{R_{yz} \text{ } x=0} (6 - 2y - 3z) \, dx \, dA_{yz}$$

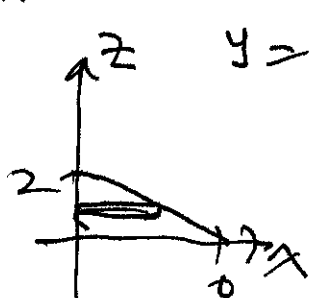


$$x=0 \quad 2y + 3z = 6$$

$$\int_{z=0}^2 \int_{y=0}^{\frac{6-3z}{2}} \int_0^{6-2y-3z} f \, dx \, dy \, dz$$



$$y=0 \rightarrow \frac{6-x-3z}{2}$$



$$y=0 \quad x + 3z = 6$$

$$\int_{z=0}^2 \int_{x=0}^{6-3z} \int_{y=0}^{\frac{6-x-3z}{2}} f \, dy \, dx \, dz$$

Evaluating Triple Integrals

$$24 \quad \int_0^1 \int_0^x \int_0^{x+y} (2x+y-z) dz dy dx$$

$$\int_0^1 \int_0^x 2xz + yz - z \Big|_0^{x+y} dy dx$$

$$\int_0^1 \int_0^x 2x(x+y) + y(x+y) - (x+y) dy dx$$

$$\int_0^1 \int_0^x 2x^2 + 3xy + y^2 - x - y dy dx$$

$$\int_0^1 2x^2y + \frac{3}{2}xy^2 + \frac{y^3}{3} - xy - \frac{y^2}{2} \Big|_0^x dx$$

$$\int_0^1 (2x^3 + \frac{3}{2}x^3 + \frac{x^3}{3} - x^2 - \frac{x^2}{2}) dx$$

$$\int_0^1 \frac{23}{6}x^3 - \frac{3}{2}x^2 dx = \frac{23x^4}{24} - \frac{x^3}{2} \Big|_0^1 = \frac{23}{24} - \frac{1}{2} = \frac{11}{24}$$

HW pg 1003 - 1005

25, 31, 35, 36, ~~37~~, 38
16, 18, 19