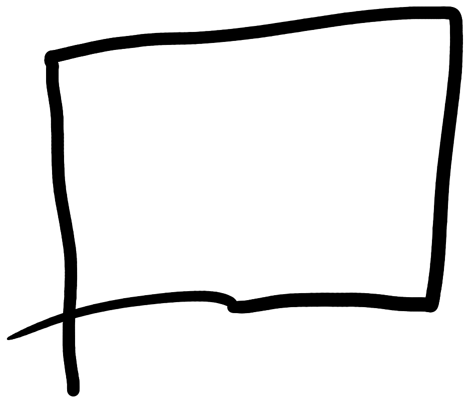
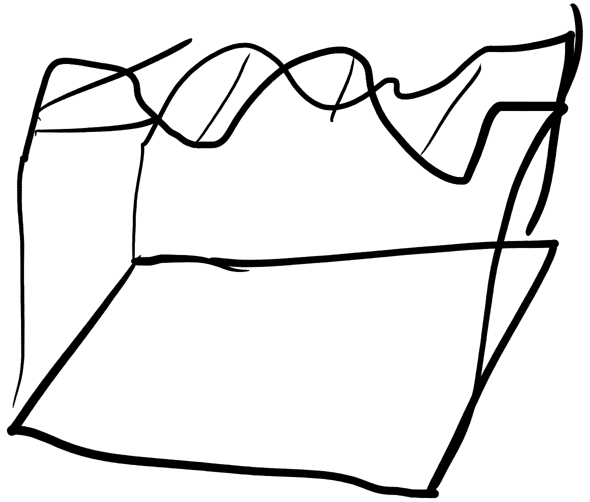




$$\iint_R f\,dA = \int_a^b \int_c^d f(x,y)\,dy\,dx$$

Volume of region bounded by

$z = x+y,\ z=10,\ x=0,\ y=0 \Rightarrow x+y \leq 10 \quad y \leq 10-x$

$$\int_0^{10}\int_0^{10-x} 10-(x+y)\,dy\,dx = \int_0^{10}\left(10y - xy - \frac{y^2}{2}\Big|_0^{10-x}\right)dx$$

$$= \int_0^{10} 100 - 10x - 10x + x^2 - \frac{1}{2}(100 - 20x + x^2)\,dx$$

$$= \int_0^{10} 50 - 10x + \frac{x^2}{2}\,dx = 500/6.$$

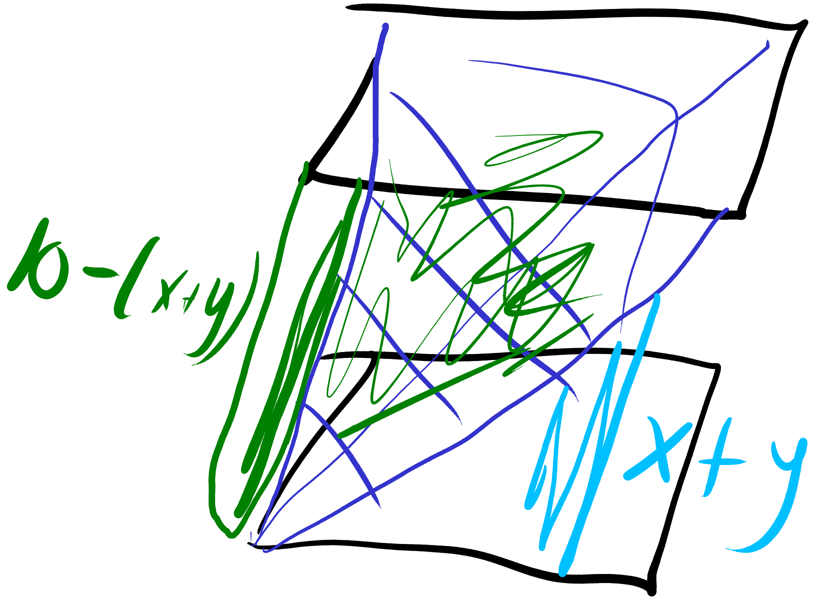
Volume of region bounded by

$z=x+y$, $z=10$, $x=0$, $y=0$ $\Rightarrow$ $x+y \le 10$ $\quad y \le 10-x$

$0-x$

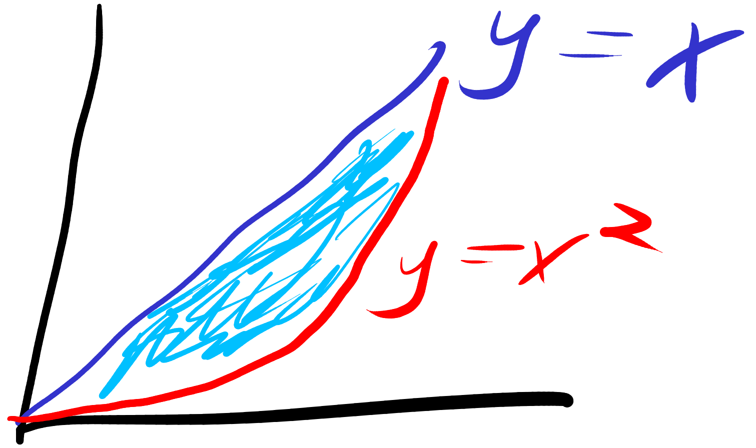
$$\int_0^{10}\int_0^{10-x}\int_{x+y}^{10} 1\, dz\, dy\, dx =$$

$$= \int_0^{10}\int_0^{10-x} 10-(x+y)\, dy\, dx$$



Average value of $f(x,y) = y(x-1)$

on R bdd by $y = x,\ y = x^2$



$$\int_0^1 \int_{x^2}^{x} y(x-1)\,dy\,dx = \int_0^1 \frac{y^2}{2}(x-1)\Big|_{x^2}^{x} dx = \cdots = -\frac{1}{40}$$

$$\boxed{\int_0^1 \int_y^{\sqrt{y}} y(x-1)\,dx\,dy = \cdots = -1/40.}$$

is the total value of f on R

$A = 1/6$

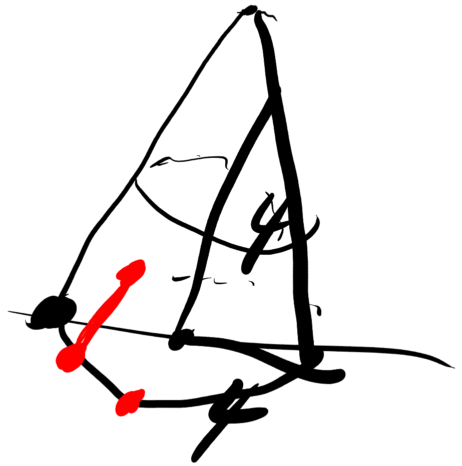
$$\text{Average} = \frac{-1/40}{1/6} = -3/20$$

Mass of cone bdd by xy plane

and $z = 4 - \sqrt{x^2+y^2}$ $\quad \sqrt{x^2+y^2} \le 4$

density is $\delta(x,y,z) = xz$ $\quad x^2+y^2 \le 16$

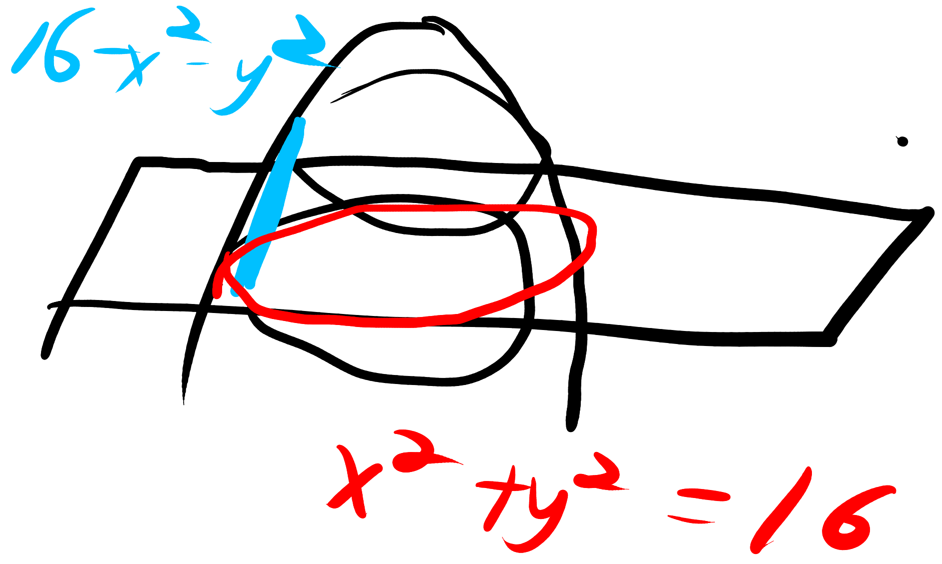
$y^2 \le 16 - x^2$



$$\int_{-4}^{4} \int_{-\sqrt{16-x^2}}^{\sqrt{16-x^2}} \int_{0}^{4-\sqrt{x^2+y^2}} xz \, dz \, dy \, dx$$

Volume of solid below $f(x,y) = 25 - x^2 - y^2$

above $z = 9$

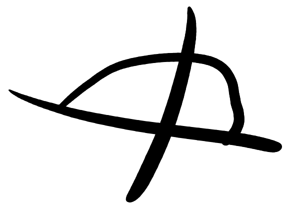


$$\int_{-4}^{4} \int_{-\sqrt{16-x^2}}^{\sqrt{16-x^2}} 16 - x^2 - y^2 \, dy \, dx.$$

5.15

$$\int_{-4}^{4} \int_{-\sqrt{16-x^2}}^{\sqrt{16-x^2}} \int_{9}^{25-x^2-y^2} 1 \, dz \, dy \, dx$$

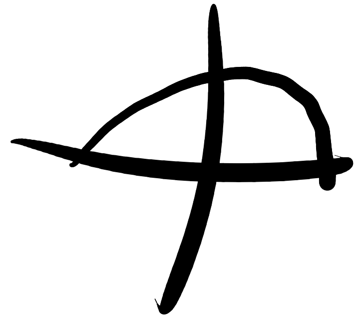
5.20



Integrate x^2y over upper half of unit circle

$$\int_{-1}^{1}\int_{0}^{\sqrt{1-x^2}} x^2 y \, dy \, dx = \int_{-1}^{1} x^2 \frac{y^2}{2}\Big|_0^{\sqrt{1-x^2}} dx$$

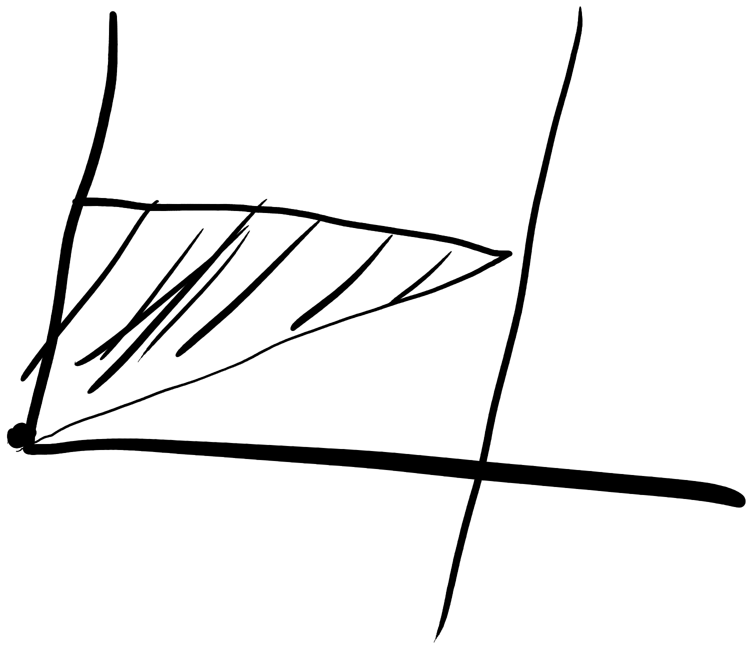
$$= \int_{-1}^{1} x^2 \frac{1-x^2}{2} \, dx = 2/15$$

integrate x^2y^2 ovr 

$$\int_{-1}^{1}\int_{0}^{\sqrt{1-x^2}} x^2y^2\,dy\,dx = \int_{-1}^{1} x^2\frac{y^3}{3}\Big|_{0}^{\sqrt{1-x^2}} dx$$

$$=\frac{1}{3}\int_{-1}^{1} x^2(1-x^2)^{3/2}\,dx = \dots = \frac{1}{144}\left(x\sqrt{1-x^2}\,(-8x^4+14x^2-3) + 3\arcsin(x)\right)\Big|_{-1}^{1}$$

5.17 $\displaystyle\int_0^6 \int_{x/3}^2 x\sqrt{y^3+1}\,dy\,dx$



$$= \int_0^2 \int_0^{3y} x\sqrt{y^3+1}\,dx\,dy = \int_0^2 \frac{x^2}{2}\sqrt{y^3+1}\,\Big|_0^{3y}\,dy$$

$$= \int_0^2 \frac{9y^2}{2}\sqrt{y^3+1}\,dy = (y^3+1)^{3/2}\Big|_0^2 = 27-1=26.$$