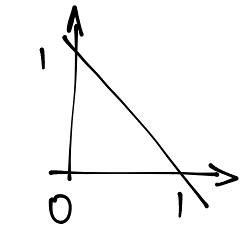
July 18th

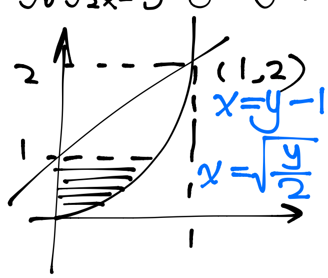
Find the volume of region above the △ in xy-plane with vertices (0,0), (1,0), (0,1) and below $z=6xy(1-x-y)$



$$\int_0^1\int_0^{1-x}\int_0^{6xy(1-x-y)} 1\, dz\,dy\,dx$$

always starting from 1

$$\int_0^1\int_{2x^2}^{x+1} f(y)\,dy\,dx = \int_0^1 [\ ?\ ]\,dy + \int_1^2 [\ ?\ ]\,dy$$



① $\int_0^1 \boxed{\int_0^{\sqrt{\frac{y}{2}}} f(y)\,dx}\,dy$ $= f(y)\cdot\sqrt{\frac{y}{2}}$

② $\int_1^2 \boxed{\int_{y-1}^{\sqrt{\frac{y}{2}}} f(y)\,dx}\,dy$ $= f(y)\left(\sqrt{\frac{y}{2}}-y+1\right)$

give $g: \mathbb{R}\to\mathbb{R}$ is continuous

$h(x)=\int_0^x\int_0^y g(t)\,dt\,dy$

prove $h(x)=\int_0^x (x-t)g(t)\,dt$

integration by parts

$\int fg' = fg - \int f'g$

Proof: $h(x) = \int_0^x x g(t)\,dt - \int_0^x t g(t)\,dt$

$= x\int_0^x g(t)\,dt - \left(t\int_0^x g(t)\Big|_0^x - \int_0^x\int_0^y g(t)\,dt\,dy\right)$