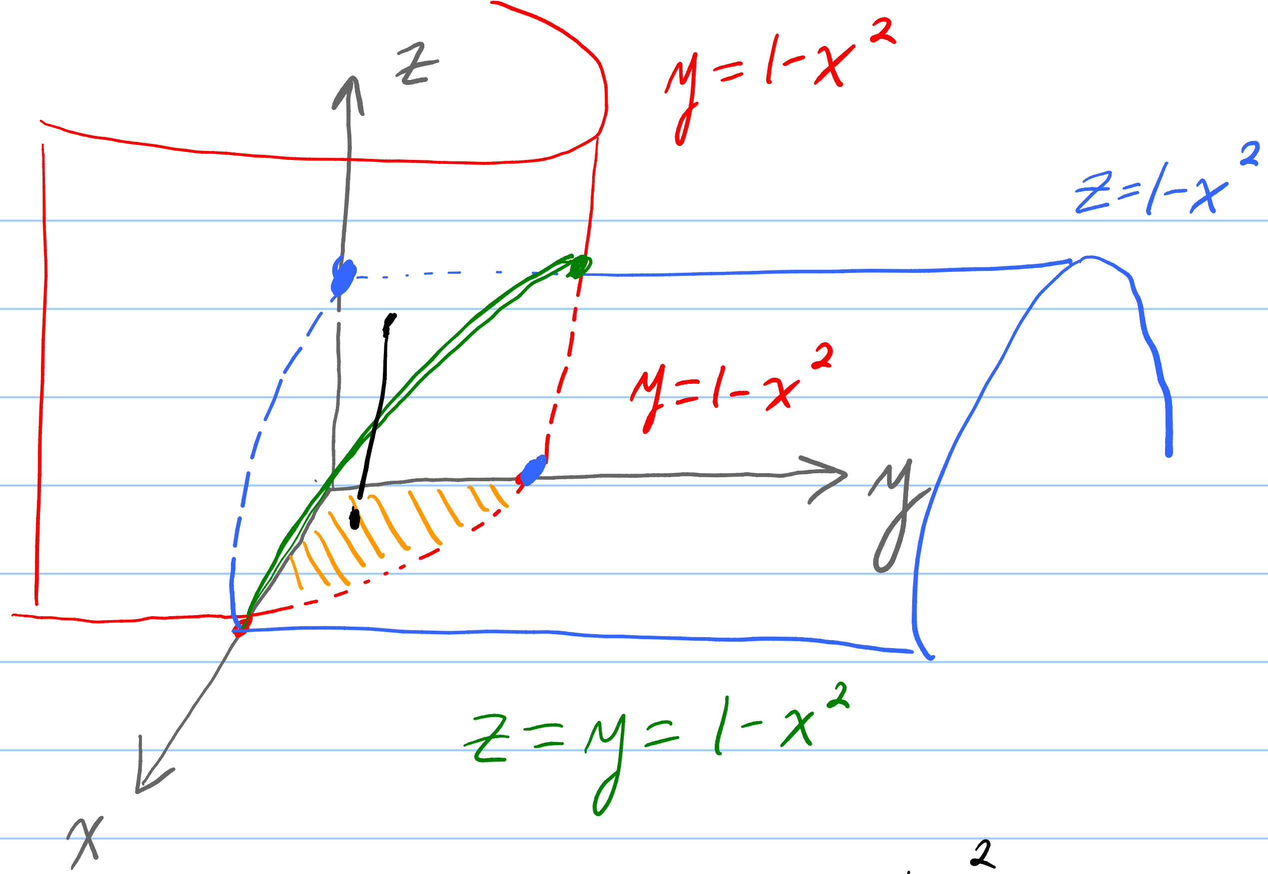
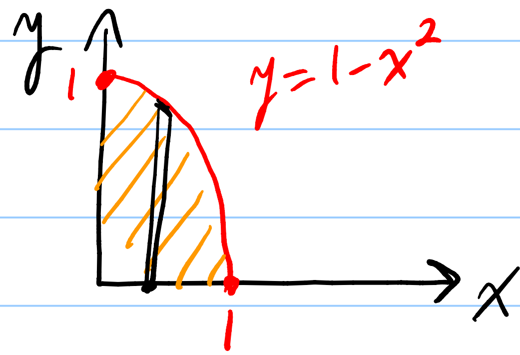
432:10.





$$\int_0^1 \left(\int_0^{1-x^2} \underbrace{(1-x^2)}_{z} \, dy \right) dx$$

425:13.

$$\underbrace{2e^{x^2} x \cos 2y}_{F} \, dx \underbrace{- 2e^{x^2} \sin 2y}_{G} \, dy$$

$F\hat{i} + G\hat{j}$

$\text{Curl}(F\hat{i} + G\hat{j}) = 0$

$$\boxed{\frac{\partial F}{\partial y} = \frac{\partial G}{\partial x}}$$

$$\frac{\partial F}{\partial y} = -4xe^{x^2} \sin 2y = \frac{\partial G}{\partial x} = -2(2xe^{x^2}) \sin 2y$$

$$\int_{(0,0,0)}^{(a,b,c)} F\,dx + G\,dy$$

Want f with $\begin{cases} \dfrac{\partial f}{\partial x} = 2x e^{x^2} \cos 2y & (A) \\ \dfrac{\partial f}{\partial y} = -2 e^{x^2} \sin 2y & (B) \end{cases}$

(A): $f = \int 2x e^{x^2} \cos 2y \, dx$

$$= e^{x^2} \cos 2y + h(y)$$

(B): $\dfrac{\partial f}{\partial y} = \dfrac{\partial}{\partial y}\left(e^{x^2} \cos 2y + h(y)\right)$

$$= -2e^{x^2} \sin 2y + h'(y) \overset{\text{want}}{=} -2e^{x^2} \sin 2y$$

$$h'(y) = 0$$

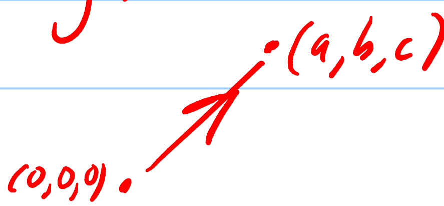
So $h(y) = C$, a const.

Take $C = 0$.

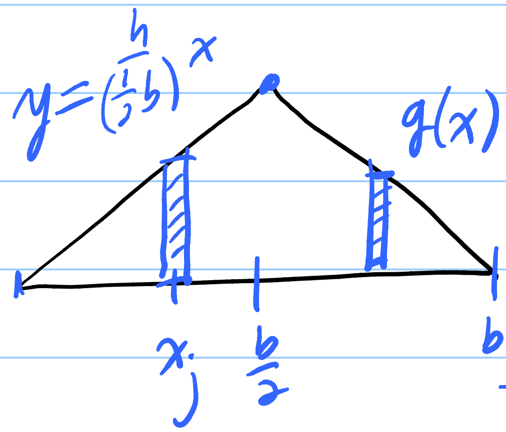
$$\int_\gamma \nabla f \cdot d\vec{r} = f(\vec{B}) - f(\vec{A})$$

Another way: Curl $(F\hat{\imath} + G\hat{\jmath}) \equiv 0$.

So $\int_{(0,0,0)}^{(a,b,c)}$ is IoP.



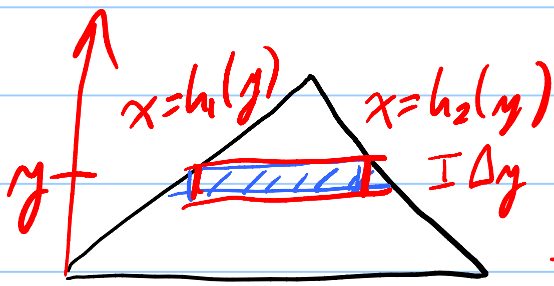
432: 12. $\bar{x} = \dfrac{\iint x\, dA}{\iint dA}$ $\bar{y} = \dfrac{\iint y\, dA}{\iint dA}$



$\sum x_j\, f(x_j)\Delta x$

$\rightarrow \int_0^b x\, f(x)\, dx$

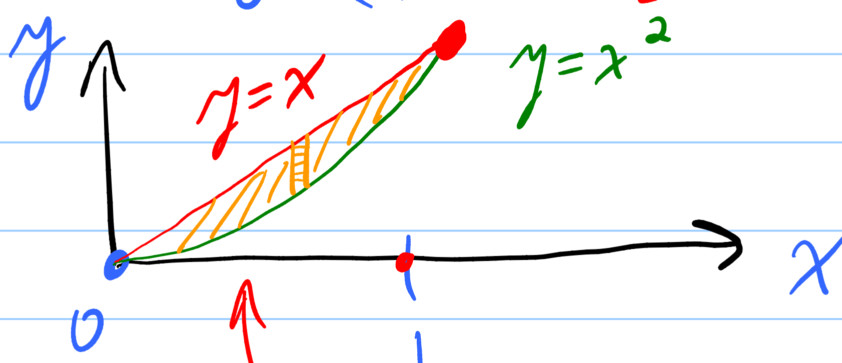
$$\int_0^{b/2} x\left(\frac{2h}{b}x\right)dx + \int_{b/2}^{b} x\,(g(x))\, dx$$



$\sum y_j\, \Delta A_j$

$\rightarrow \int_0^h y\,(h_2(y) - h_1(y))\, dy$

432: 5. $\displaystyle\int_0^1 \left(\int_{x^2}^{x} \underbrace{(1-2xy)}_{z}\, dy \right) dx = V$

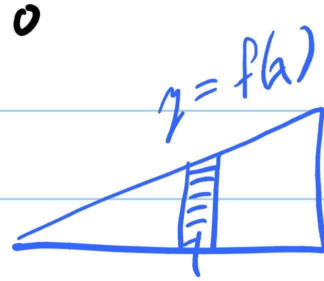


under $z = 1 - 2xy$ over R

region of integration. R

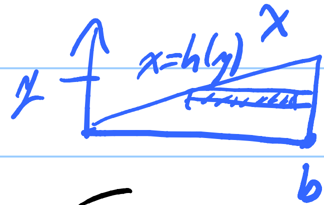
432: 17: I_x, I_y, I_0

$$I_x = \iint x^2 \, dA$$



$\sum x^2 f(x) \Delta x$

$$I_y = \iint y^2 \, dA$$



$\sum y^2 (b - h(y)) \Delta y$

$$I_0 = \iint r^2 \, dA = I_x + I_y$$