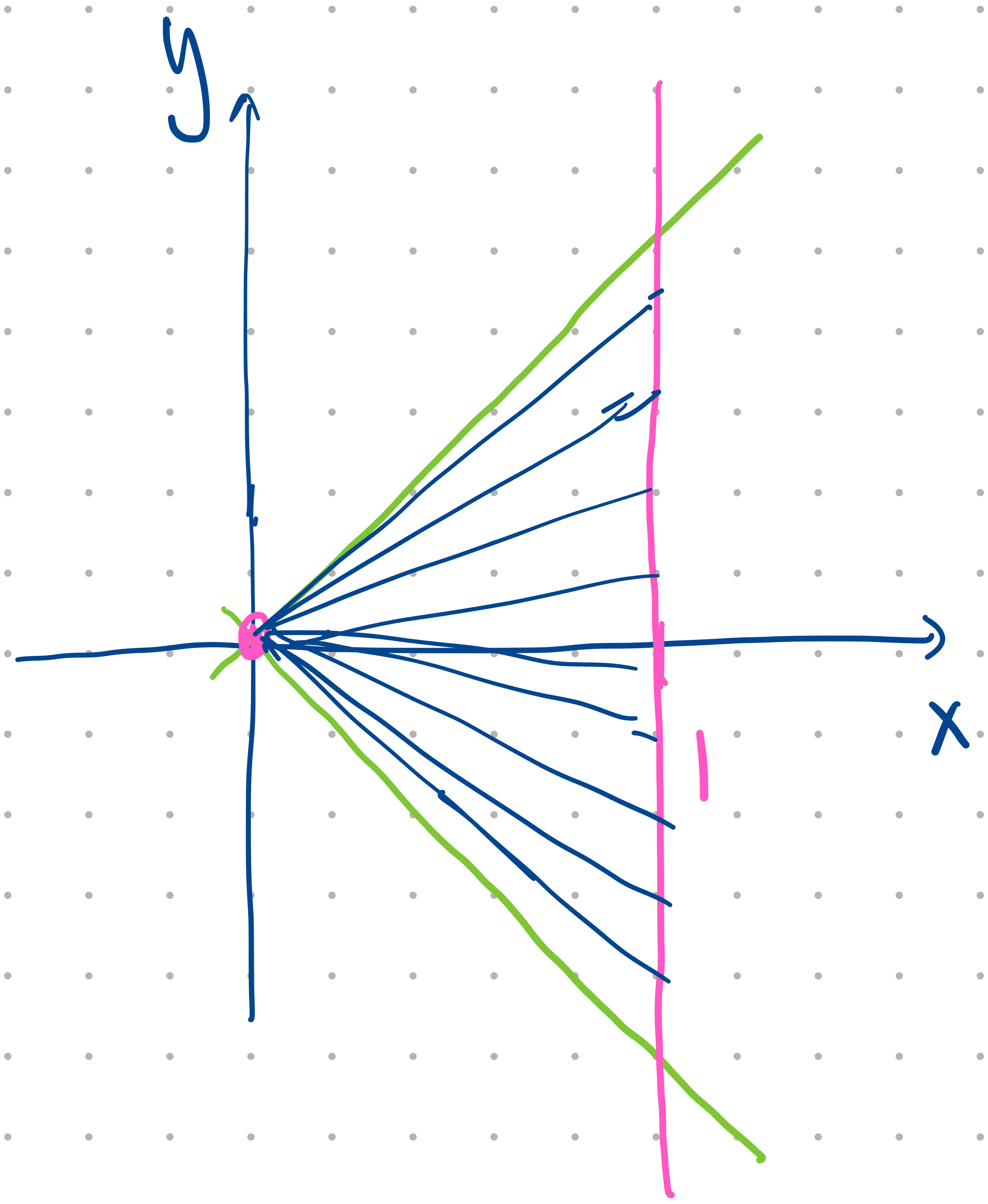
Compute the below by converting to Cartesian

$$\int_{-\pi/4}^{\pi/4}\int_{0}^{\sec\theta} r^4\cos\theta\,dr\,d\theta$$



$x = r\cos\theta$

$y = r\sin\theta$

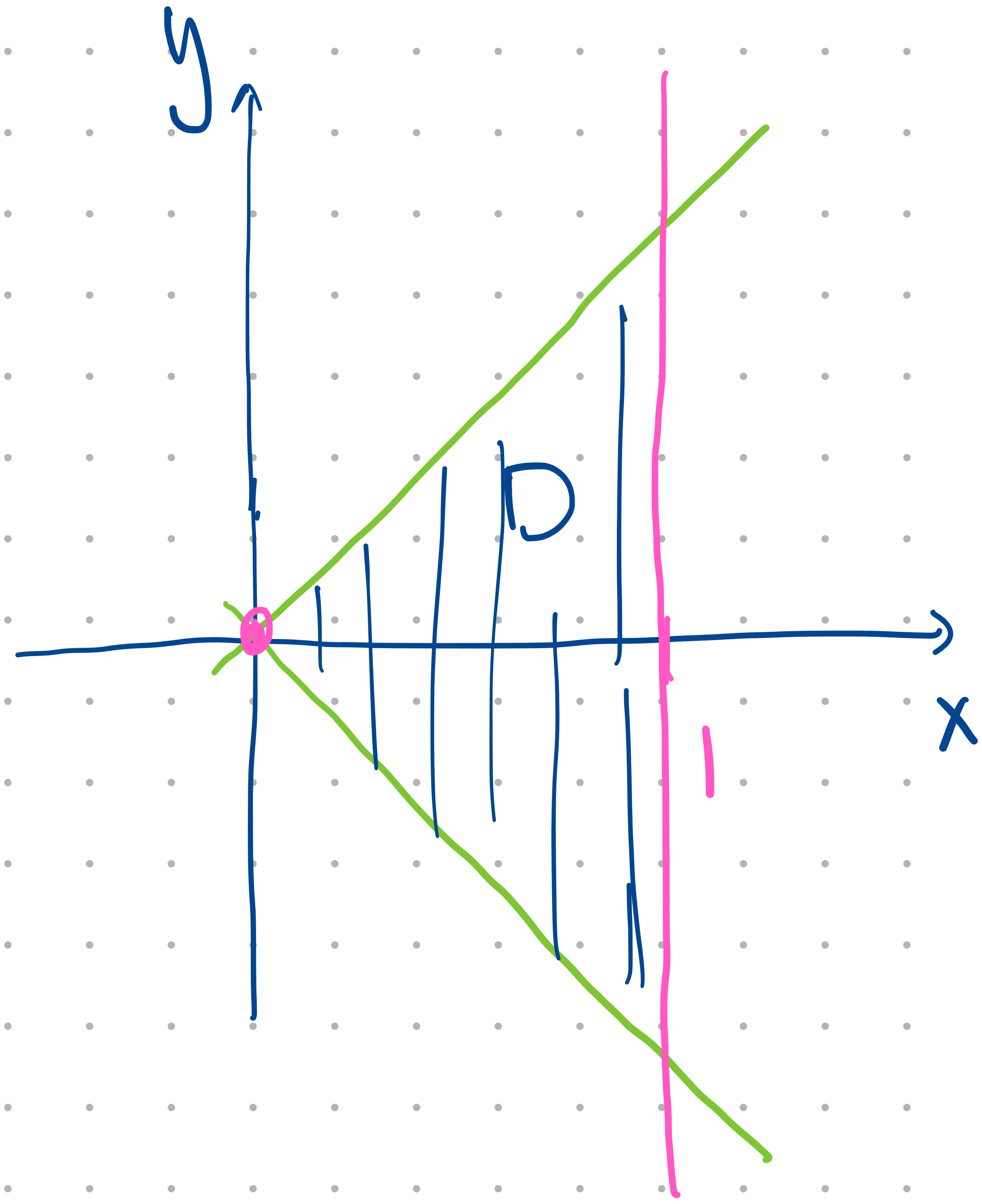
$$\boxed{-\frac{\pi}{4} \le \theta \le \frac{\pi}{4}}$$

$$\boxed{0 \le r \le \sec\theta}$$

$r = \sec\theta$

$r\cos\theta = 1$

$x = 1$



$r^4 \cos\theta \, dr \, d\theta$

$= r^3 \cos\theta \underbrace{r \, dr \, d\theta}_{(dx\,dy \text{ or } dy\,dx)}$

$= (r^2)(r\cos\theta) \, dx\,dy$

$= (x^2+y^2)\, x \quad dx\,dy$

$$\iint_D (x^3 + xy^2) \; dx\,dy \text{ or } dy\,dx$$

this only needs one integral

$$= \int_0^1 \int_{-x}^{x} (x^3 + xy^2) \, dy\,dx = \ldots\ldots$$

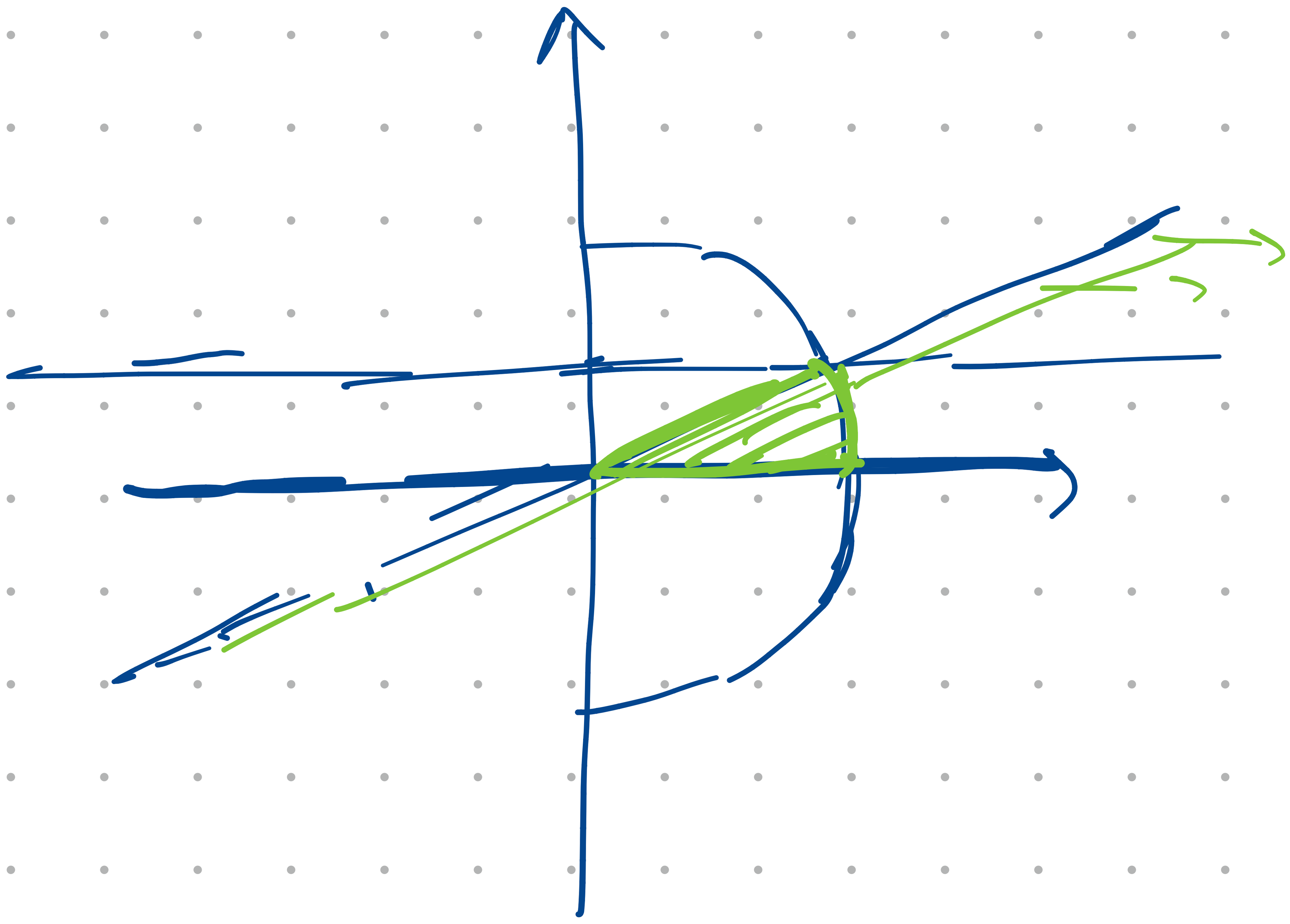
$$= 8/15$$

#15.3.31

$$\int_0^{1/2}\int_{\sqrt{3}y}^{\sqrt{1-y^2}} \, dx\, dy$$

$\sqrt{3}y \leq x \leq \sqrt{1-y^2}$

$0 \leq y \leq 1/2$

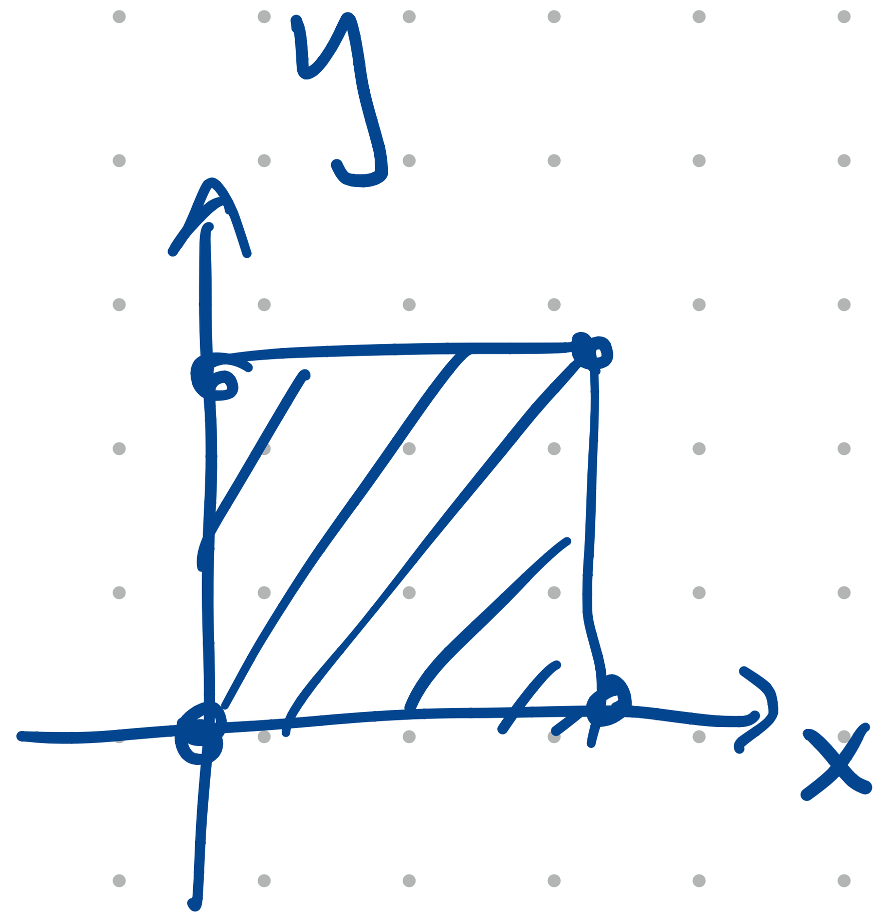


- $\sqrt{3}y = x$
- $x = \sqrt{1-y^2}$

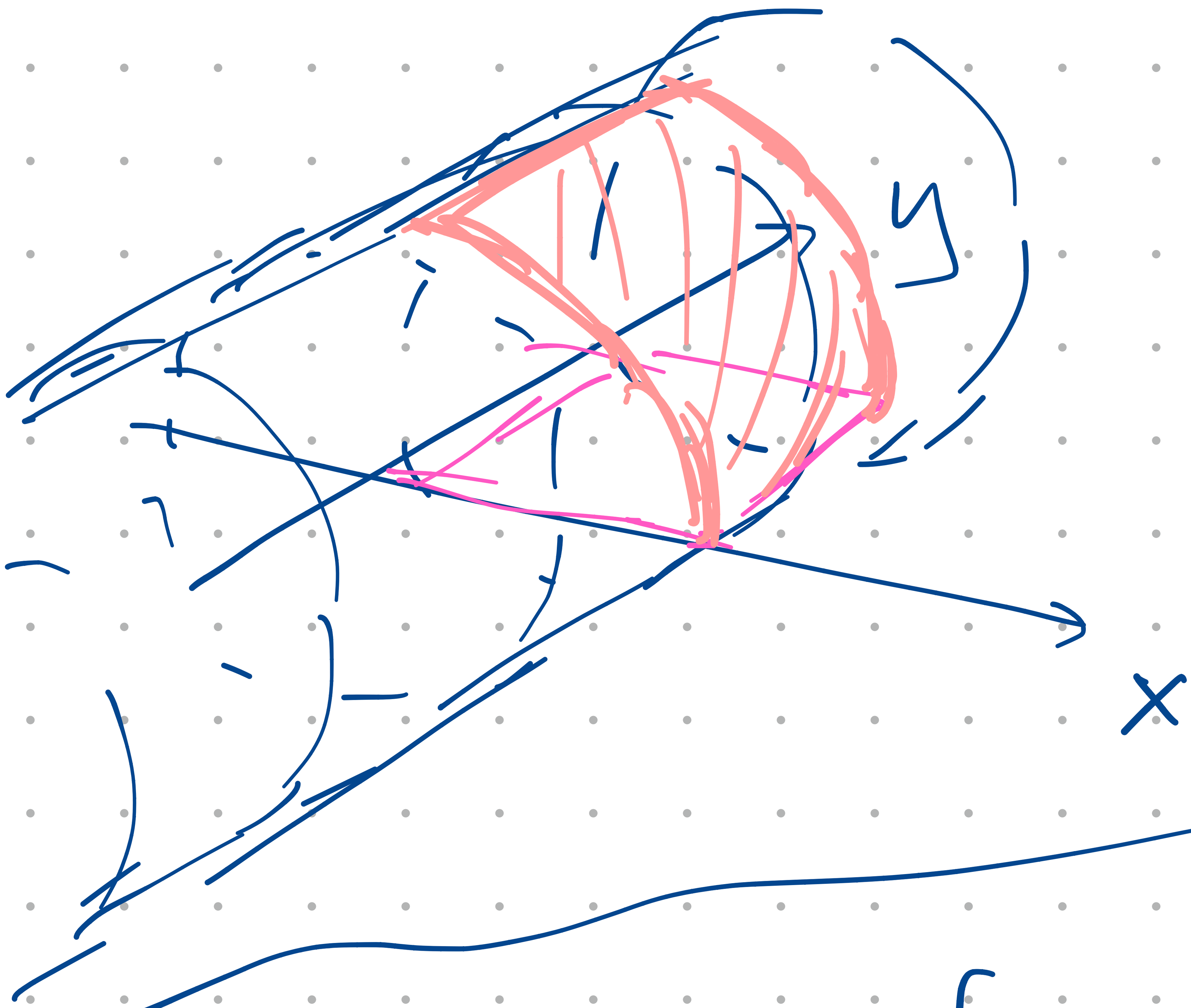
  $x^2 = 1-y^2, \; x^2+y^2 = 1$
- $y = 0$
- $y = 1/2$

#15.5.6

part of $x^2+z^2=4$ above



$$z = +\sqrt{4-x^2} = f(x,y)$$



$$\int_0^1\int_0^1 \sqrt{f_x^2+f_y^2+1}\,dx\,dy$$

then compute...

Language comment:

The part of ______ inside of ______

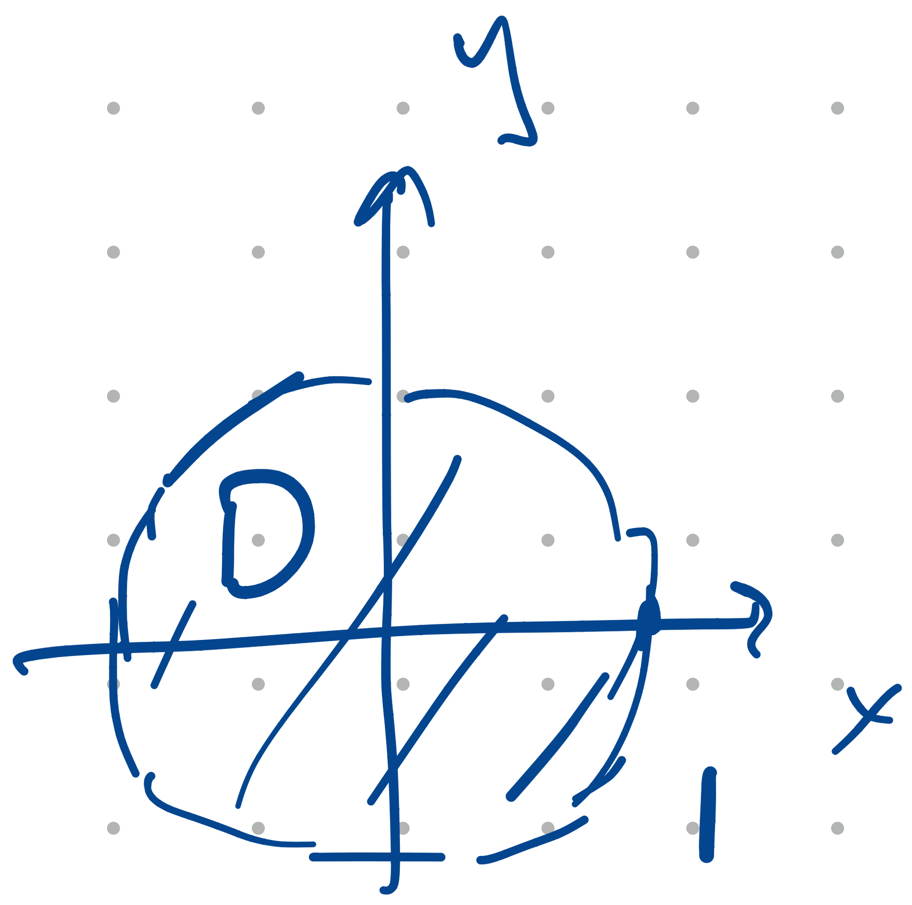
determines the integrand

determine the bounds.

#15.5.13

$f(x,y)$

$$z = \frac{1}{1+x^2+y^2}$$ over



$$\iint_D \sqrt{f_x^2 + f_y^2 + 1}\ dx\,dy$$

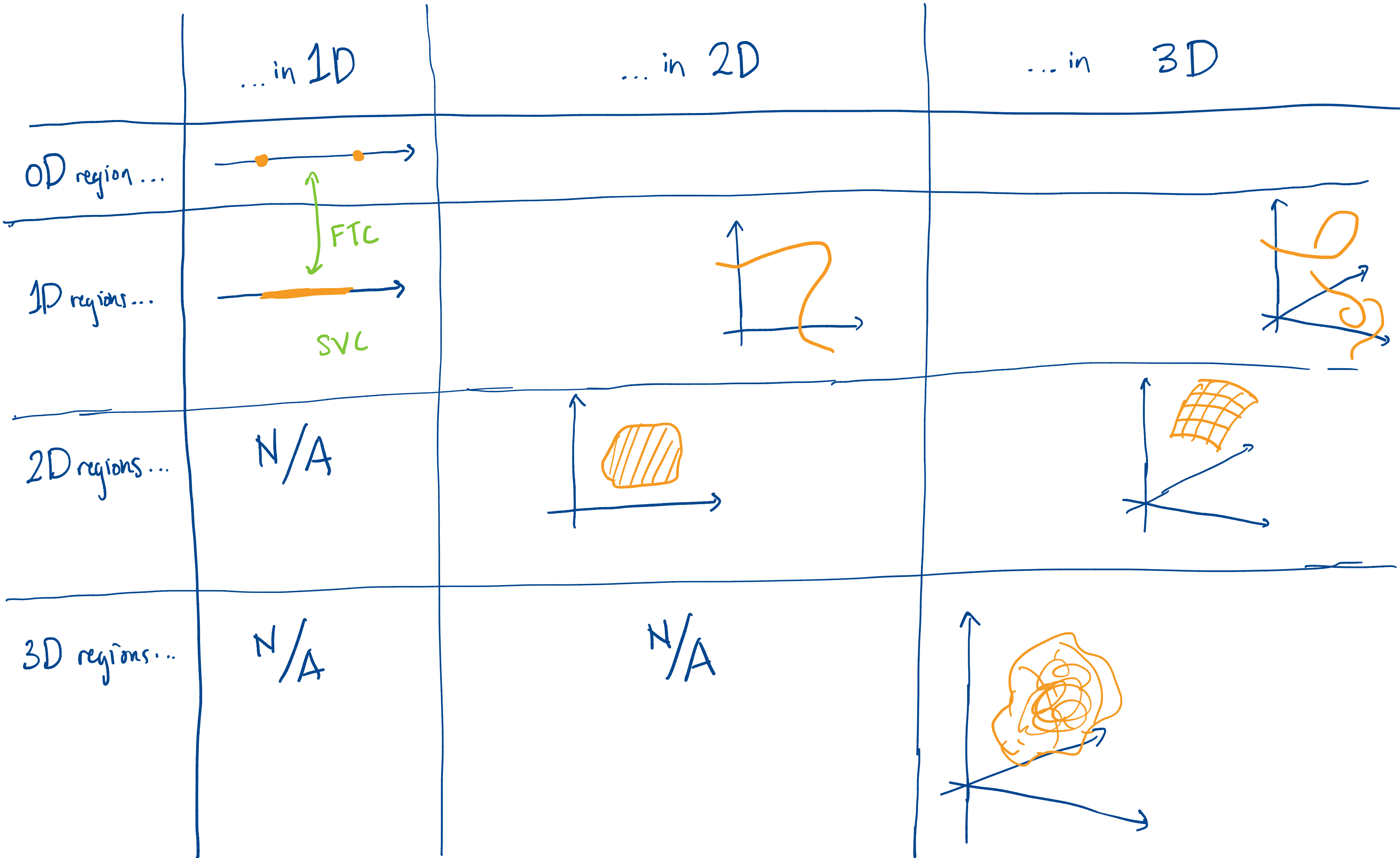
$$f_x(x,y) = -(1+x^2+y^2)^{-2}(2x)$$

$$(f_x(x,y))^2 = \frac{4x^2}{(1+x^2+y^2)^4}$$

$$\iint_D \sqrt{\frac{4x^2+4y^2}{(1+x^2+y^2)^4} + 1}\ dx\,dy$$

$$= \int_0^{2\pi} \int_0^1 \sqrt{\frac{4r^2}{(1+r^2)^4} + 1} \; r \, dr \, d\theta$$

$$= \int_0^1 \sqrt{\frac{4r^2}{(1+r^2)^4} + 1} \; r \, dr \cdot 2\pi$$


... in 1D
... in 2D
... in 3D
0D region ...
1D regions ...
2D regions ...
3D regions ...
FTC
SVC
N/A
N/A
N/A