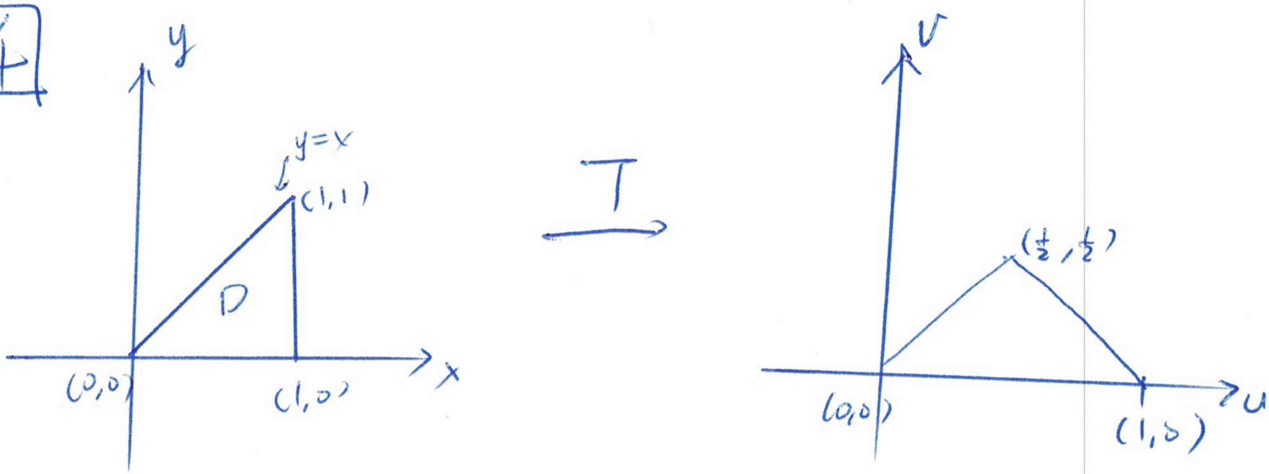
§6.2.

$\boxed{4}$



From problem, $x = u + v$ — ①

$y = u - v$ — ②

①+② : $x+y = 2u \Rightarrow u = \frac{x+y}{2}$

①−② : $x-y = 2v \Rightarrow v = \frac{x-y}{2}$.

Thus we have

$$T(x,y) = \begin{bmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & -\frac{1}{2} \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} u \\ v \end{bmatrix}$$

Three vertice of D are $(0,0), (1,0), (1,1)$.

We put them into mapping T, then we get

$T(0,0) = (0,0)$

$T(1,0) = (\frac{1}{2}, \frac{1}{2})$

$T(1,1) = (1,0)$

So, we have integral region D^* is a triangle with vertices $(0,0)$, $(\frac{1}{2},\frac{1}{2})$, $(1,0)$.

By changing of variables,

$$\iint_D (x+y)\,dx\,dy = \int_0^{1/2}\int_v^{1-v} [(u+v)+(u-v)] \left|\frac{\partial(x,y)}{\partial(u,v)}\right| du\,dv$$

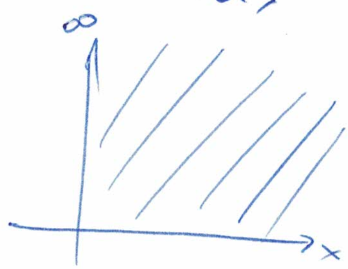
$$= \cdots$$

$\boxed{22}$ Let $A = \int_0^\infty e^{-4x^2} dx$.

$$A^2 = \left(\int_0^\infty e^{-4x^2} dx\right)\left(\int_0^\infty e^{-4y^2} dy\right)$$

$$= \int_0^\infty \int_0^\infty e^{-4x^2-4y^2} \, dx \, dy$$

By polar coordinate, $x = r\cos\theta$, $y = r\sin\theta$.

From,  , we know $0 \le r < \infty$

$0 \le \theta \le \pi/2$.

$$= \int_0^{\pi/2} \int_0^\infty e^{-4r^2} \, r \, dr \, d\theta$$

$\vdots$