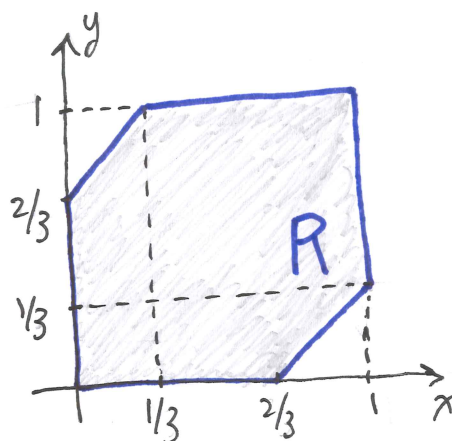


4. Evaluate the following integrals.

a.  $\iint_R (1+x-y) dA$  where  $R = \{(x,y) : |x-y| \leq 2/3 \text{ and } 0 \leq x \leq 1 \text{ and } 0 \leq y \leq 1\}$

$$\iint_R (1+x-y) dA = \iint_R dA + \underbrace{\iint_R x dA - \iint_R y dA}_0 \text{ by symmetry}$$

$$= (\text{Area of } R) = 1^2 - \left(\frac{1}{3}\right)^2 = \frac{8}{9}$$



b.  $\int_{-1}^1 \int_0^{\sqrt{1-x^2}} \sin(\pi(x^2+y^2)) dy dx = \iint_R \sin(\pi(x^2+y^2)) dA$

$$= \int_0^\pi \int_0^1 \sin(\pi r^2) r dr d\theta = \int_0^\pi \left[ -\frac{1}{2\pi} \cos(\pi r^2) \right]_{r=0}^{r=1} d\theta$$

$$= \pi \cdot \frac{-1}{2\pi} (\cos \pi - \cos 0) = 1$$

