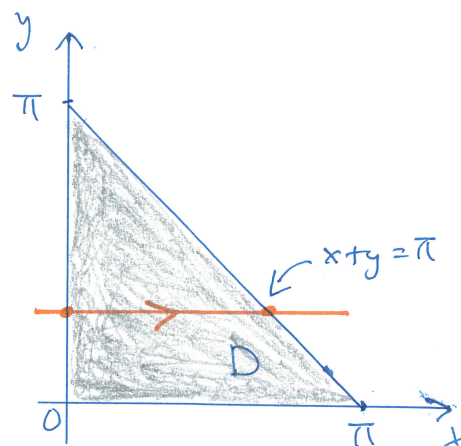


1. Evaluate the following integrals.

a. $\iint_D \sin(x+y) dA$ where $D = \{(x,y) : x+y \leq \pi, x \geq 0 \text{ and } y \geq 0\}$

$$\begin{aligned} \iint_D \sin(x+y) dA &= \int_0^\pi \int_0^{\pi-y} \sin(x+y) dx dy \\ &= \int_0^\pi [-\cos(x+y)]_{x=0}^{x=\pi-y} dy \\ &= \int_0^\pi (-\underbrace{\cos(\pi)}_{-1} + \cos(y)) dy \\ &= [y + \sin y]_0^\pi \\ &= (\pi + \underbrace{\sin \pi}_0) - (0 + \underbrace{\sin 0}_0) = \pi \end{aligned}$$



b. $\int_0^4 \int_{\sqrt[3]{8-2x}}^2 e^{(4-x)/y} dy dx = \iint_D e^{(4-x)/y} dA$

$$\begin{aligned} &= \int_0^2 \int_{(8-y^3)/2}^4 e^{(4-x)/y} dx dy = \int_0^2 \left[-y e^{(4-x)/y} \right]_{x=(8-y^3)/2}^{x=4} dy \end{aligned}$$

$$= \int_0^2 (-y + y e^{y^2/2}) dy$$

$$= \left[-\frac{1}{2} y^2 + e^{y^2/2} \right]_0^2$$

$$= (-2 + e^2) - (0 + 1)$$

$$= e^2 - 3$$

