

SOLUTIONS: DOUBLE INTEGRALS II

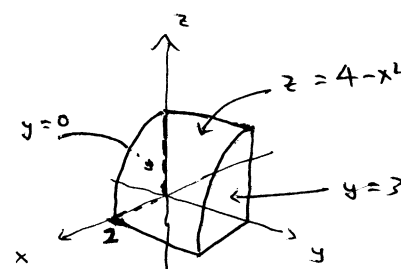
(1)

SECTION ONE

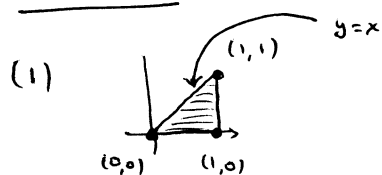
$$\begin{aligned}
 (1) \quad \iint_R x \sin y \, dA &= \int_{x=0}^{x=1} \int_{y=-\pi/2}^{y=\pi/2} x \sin y \, dy \, dx \\
 &= \int_{x=0}^{x=1} \left[-x \cos y \right]_{y=-\pi/2}^{y=\pi/2} dx = \int_{x=0}^{x=1} 0 \, dx = \underline{\underline{0}}
 \end{aligned}$$

$$\begin{aligned}
 (2) \quad \text{Volume} &= \iint_{[0,1] \times [0,2]} x^2 + 2xy \, dA = \int_{y=0}^{y=2} \int_{x=0}^{x=1} x^2 + 2xy \, dx \, dy \\
 &= \int_{y=0}^{y=2} \left[\frac{1}{3} x^3 + x^2 y \right]_{x=0}^{x=1} dy \\
 &= \int_{y=0}^{y=2} y + \frac{1}{3} dy = \underline{\underline{14/3}}
 \end{aligned}$$

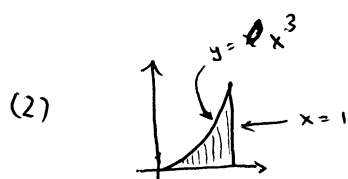
$$\begin{aligned}
 (3) \quad \text{Volume} &= \iint_{[0,2] \times [0,3]} 4 - x^2 \, dA \\
 &= \int_{y=0}^{y=3} \int_{x=0}^{x=2} 4 - x^2 \, dx \, dy \\
 &= \int_{y=0}^{y=3} \left[4x - \frac{1}{3} x^3 \right]_{x=0}^{x=2} dy = \int_{y=0}^{y=3} 16/3 \, dy = \underline{\underline{16}}
 \end{aligned}$$



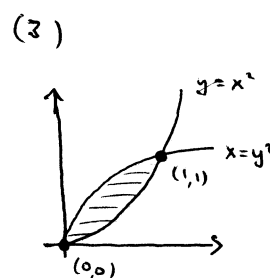
SECTION TWO



$$\begin{aligned}
 (1) \quad \iint_T x^2 y \, dA &= \int_{y=0}^{y=1} \int_{x=y}^{x=1} x^2 y \, dx \, dy \\
 &= \int_{y=0}^{y=1} \left[\frac{1}{3} x^3 y \right]_{x=y}^{x=1} dy \\
 &= \int_{y=0}^{y=1} \frac{1}{3} y - \frac{1}{3} y^4 dy = \underline{\underline{1/10}}
 \end{aligned}$$



$$\begin{aligned}
 (2) \quad \iint_R x^2 + y^2 \, dA &= \int_{x=0}^{x=1} \int_{y=0}^{y=x^3} x^2 + y^2 \, dy \, dx \\
 &= \int_{x=0}^{x=1} \left[x^2 y + \frac{y^3}{3} \right]_{y=0}^{y=x^3} dx = \underline{\underline{1/5}}
 \end{aligned}$$



$$\begin{aligned}
 (3) \quad \iint_R x+y \, dA &= \int_{y=0}^{y=1} \int_{x=y^2}^{x=\sqrt{y}} x+y \, dx \, dy \\
 &= \int_{y=0}^{y=1} \left[\frac{1}{2} x^2 + xy \right]_{x=y^2}^{x=\sqrt{y}} dy \\
 &= \underline{\underline{3/10}}
 \end{aligned}$$