1. Compute

(a) $\int_0^1 \Big(\int_0^1 (x+y)dy \Big) dx,$ (b) $\int_0^4 \Big(\int_4^{12} x\ y\ dy \Big) dx,$ (c) $\int_{-1}^1 \int_{x^2}^1 \int_0^2 (4+z)\ dzdydx,$

(d) $\int_0^1 \int_0^{\sqrt{x}} \int_{1-x}^{2-2x} y\ dzdydx,$

2. Evaluate the integrals by reversing the order of integration

(a) $\int_0^2 (\int_x^{2x} dy)dx,$ (b) $\int_1^2 (\int_{2-x}^{\sqrt{2x-x^2}} dy)dx,$ (c) $\int_0^1 (\int_{x^3}^{x^2} dy)dx,$ (d) $\int_1^e (\int_0^{\ln x} dy)dx,$

(e) $\int_{-2}^1 (\int_{y^2}^4 dx)dy,$ (f) $\int_0^1 (\int_x^{2-x^2} q\ dy)dx,$ (g) $\int_1^2 (\int_{\frac{1}{y}}^y z\ dx)dy.$

3. Find integrals of the function over the region A:

(a) $f(x,y) = x \cdot y$ and A is the rectangle bounded by curves $x=0,\ x=a, y=0,\ y=b,$

(b) $f(x,y) = 2x+y-1$ and A is the traingle with corners $A(1,1),\ B(5,3),\ C(5,5),$

(c) $f(x,y) = \sin(x+y)$ and A is the region bounded by $y=0,\ y=x,\ x+y=\frac{\pi}{2},$

(d) $f(x,y) = \frac{1}{\sqrt{x^2+y^2}}$ and $A = \{\ (x,y) \in R^2,\ a^2 < x^2+y^2 \le b^2\ a>0, b>0\},$

(e) $f(x,y) = x^2+y^2-a^2$ and $A = \{\ (x,y) \in R^2,\ x^2+y^2 \le ax,\ a>0\ \},$

(f) $f(x,y) = y\ \sqrt{x^2+y^2}$ and $A = \{\ (x,y) \in R^2,\ x^2+y^2 < 9, x<0\ \},$

(g) $f(x,y,z) = \frac{1}{1-x-y}$ and A is the region bounded by $x+y+z=1, x=0,\ y=0,\ z=0,$

(h) $f(x,y,z) = (18x^2+8y^2)e^z$ and $A = \{(x,y,z) \in R^3;\ \frac{x^2}{4}+\frac{y^2}{9} < 1,\ |z|<2\},$

(i) $f(x,y,z) = 2x+3y-z,$ and A is the rectangular box bounded by $x=0, y=0,\ z=0,\ z=3,\ x+y=2,$

(j) $f(x,y,z) = z\sin(x^2+y^2)$ and A is the region bounded by $x=0, y=0, z=0,\ z=1,\ x^2+y^2=1,$

(k) $f(x,y,z) = ze^{-\frac{9x^2+4y^2}{2}}$ and $A = \{\ (x,y,z) \in R^3,\ \frac{x^2}{4}+\frac{v^2}{9} \le 1,\ 0 \le z \le 1\},$

(l) $f(x,y,z) = xyz$ and A is the region bounded by $x^2+y^2+z^2=1, x=0, y=0, z=0.$

4. Find the area bounded by the curves

(a) $y^2 = x,\ x^2 = 8y,$ (b) $3x^2 = 25y, 5y^2 = 9x.$

(c) $y = x^2-2x+2,$ the tangent at $(3,5)$, OY-axes and OX-axes,

5. Find the volume of the solid bounded by the following surfaces

(a) $x^2+y^2+z^2 = x,$

(b) $\frac{x^2}{4}+\frac{y^2}{9}+z^2 = 1,$

(c) $x=0, x=1, y=2, y=5, z=2, z=4,$

(d) $x+y+z=1, x=0, y=0, z=0,$

(e) $\frac{x^2}{4}+\frac{y^2}{9} < 1, |z| < 2,$

(f) $x=0, y=0, z=0, z=1, x^2+y^2-2y=3,$

(g) $x^2+y^2+z^2=1,\ x \ge 0,\ y \le 0, z \in R.$