

Evaluate the following:

1. $\int_0^1 \int_0^{\sqrt{2x}} xy \, dydx$
2. $\int_0^1 \int_0^x (x^2 + y^2) x dx dy$
3. $\int_0^2 \int_0^{4-x^2} e^{x^2} dx dy$
4. $\int_0^a \int_y^{\sqrt{ay}} \frac{x \, dx dy}{x^2 + y^2}$
5. $\int_0^4 \int_0^{2\sqrt{z}} \int_0^{\sqrt{4z-x^2}} dz dx dy$
6. $\int_1^e \int_1^{\log(y)} \int_1^{e^x} \log(z) dz dx dy$
7. $\int_{-3}^3 \int_0^1 \int_1^2 (x + y + z) dx dy dz$
8. $\int_{-c}^c \int_{-b}^b \int_{-a}^a (x^2 + y^2 + z^2) dx dy dz$
9. $\int_0^1 \int_0^1 \int_0^1 xyz dx dy dz$
10. $\int_0^{\log(2)} \int_0^x \int_0^{x+y} e^{x+y+z} dx dy dz$
11. $\iiint (x + y + z) dx dy dz$ over the region bounded by $x=0, y=0, z=0$ and $x+y+z=2$
12. Find area bounded by $xy = 8, y = 2x, x$ -axis and lines $x=0, x=4$
13. Find the area bounded by $y^2 = 8x$ and $x^2 = 8y$
14. Find the area of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
15. Find area of region bounded by lines $y = 2-x, y = 2+x$ and x -axis.
16. $\int_0^1 \int_0^x \int_0^{xy} dx dy dz$ use polar form
17. Find the volume bounded by $y^2 = x$ and $x^2 = y$ and the plane $z = 0, x + y + z = 1$
18. Find the volume bounded by cylinder $x^2 + y^2 = 4$ and the plane $y + z = 4$
19. Find the volume bounded by tetrahedron three co-ordinates and the plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$
20. Find the volume of sphere $x^2 + y^2 + z^2 = r^2$ using polar form in positive octant.