

PROBLEMS ON DIRECT EVALUATION OF TRIPLE INTEGRAL

1. Evaluate

$$\int_0^2 \int_0^x \int_0^{2x+2y} e^{x+y+z} dx dy dz$$

2. Evaluate

$$\int_{-1}^1 dz \int_0^z dx \int_{x-z}^{x+z} (x+y+z) dz$$

3. Evaluate

$$\int_0^\pi 2d\theta \int_0^{a(1+\cos\theta)} r dr \int_0^{h[1-r/a(1+\cos\theta)]} dz$$

4. Evaluate

$$\int_0^\infty dx \int_0^x dy \int_0^\infty \frac{dz}{(1+x^2+y^2+z^2)^2}$$

5. Evaluate

$$\int_0^a \int_0^\alpha \int_0^\beta (x^2+y^2+z^2) dx dy dz, \quad \text{where } a \text{ is constant}$$

PROBLEMS ON TRIPLE INTEGRATION WHEN THE LIMITS ARE NOT PROVIDED.

6. Integrate $\iiint x^2 y z dx dy dz$ throughout the volume bounded by the region $x=0, y=0, z=0, x/a+y/b+z/c = 1$

7. Evaluate $\iiint \frac{dx dy dz}{\sqrt{1-x^2-y^2-z^2}}$ taken throughout the volume of the sphere $x^2+y^2+z^2 = 1$ in the positive octant.

8. Evaluate in terms of Gamma function $\iiint x^{a-1} y^{b-1} z^{c-1} dx dy dz$ throughout the volume of the tetrahedron given by $x \geq 0, y \geq 0, z \geq 0, x+y+z \leq 1$

9. Evaluate

$$\iiint \sqrt{1-x^2/a^2-y^2/b^2-z^2/c^2} dx dy dz \text{ throughout the volume of solid } x^2/a^2+y^2/b^2+z^2/c^2=1$$

10. Evaluate

$$\iiint_V \sqrt{x^2+y^2} dx dy dz \text{ where } V \text{ is } x^2+y^2=z^2, z \geq 0, z=0, z=1$$

11. Evaluate

$$\iiint (x^2 y^2 + y^2 z^2 + z^2 x^2) dx dy dz \text{ through out the volume of sphere } x^2+y^2+z^2=a^2$$

12. Evaluate

$$\iiint z^2 dx dy dz \text{ over the volume common to sphere } x^2+y^2+z^2=a^2 \text{ cylinder } x^2+y^2=ax$$

13. Evaluate

$$\iiint \frac{dx dy dz}{(1+x+y+z)} \text{ over the volume of tetrahedron bounded by } x=0, y=0, z=0 \text{ and } x+y+z=1$$

14. Evaluate

$$\iiint \frac{z^2}{x^2+y^2+z^2} dx dy dz$$

Where V is volume bounded by $x^2+y^2+z^2=z$

15. Evaluate

$$\int_0^{\infty} dx \int_0^x dy \int_0^{\infty} \frac{dz}{(1+x^2+y^2+z^2)^2}$$