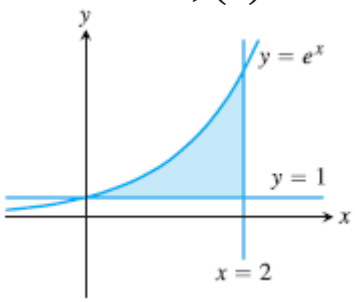
Question Bank (Module-2)

1. Evaluate $\iint_R \frac{xy^3}{x^2+1}\, dA$, $R: 0 \le x \le 1,\ 0 \le y \le 2$. **Ans. 2 ln 2**

2. Find the volume of the region bounded above by the plane $z = 2 - x - y$ and below by the square $R: 0 \le x \le 1, 0 \le y \le 1$. **Ans. 1**

3. Write an iterated integral for $\iint_R dA$ over the described region R using (a) vertical cross-sections, (b) horizontal cross sections



Ans. (a) $\int_0^2 \int_1^{e^x} dydx$ **(b)** $\int_1^{e^2} \int_{ln\, y}^2 dxdy$

4. Evaluate $\iint_R$ dxdy throughout the area bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. **Ans.** πab

5. Evaluate $\iint_R$ $r^2 dr d\theta$ over the area of the circle $r = a\cos\theta$. **Ans.** $\frac{2a^3}{3}$

6. Find the area included between the parabola $y = 4x - x^2$ and the line $y = x$. **Ans.** $\frac{9}{2}\, sq.units$

7. Reverse the order of integration of $\int_0^1 \int_{x^2}^{2-x} xy dydx$ and hence evaluate the same. **Ans.** $\frac{5}{6}$

8. Find the volume of the solid whose base is the region in the xy plane that is bounded by the parabola $y = 4 - x^2$ and the line $y = 3x$ while the top of the solid is bounded by the plane $z = x + 4$.

Ans. $\frac{625}{12}$

9. Reverse the order of integration of $\int_0^2 \int_0^{\sqrt{4-y^2}} ye^x dxdy$ and hence evaluate the same. **Ans.** $e^2 + 1$

10. Evaluate $\int_0^{\log 2} \int_0^{x} \int_0^{x+\log y} e^{x+y+z} dzdydx$ **Ans.** $\mathbf{8\frac{\log 2}{3} - \frac{19}{9}}$

11. Find the area enclosed by the lines $= 2x, y = \frac{x}{2}, and\ y = 3 - x$.

Ans. $\frac{3}{2}$

12. Evaluate: $\int_0^{\pi} \int_x^{\pi} \frac{\sin y}{y} dydx$. **Ans. 2**

13. Evaluate the volume given by integral $\int_0^1 \int_0^{2-x} \int_0^{2-x-y} dzdydx$. **Ans.** $\frac{7}{6}$

14. Reverse the order of integration and evaluate $\int_0^a \int_y^a \frac{x}{x^2+y^2} dxdy$. **Ans.** $\frac{\pi a}{4}$

15. Find the volume of the tetrahedron cut from the first octant by the plane $6x + 3y + 2z = 6$. **Ans. 1**

16. Evaluate: $\int_{-1}^{1} \int_0^{2\pi} \int_0^{1+\cos\theta} 4rdrd\theta dz$ .Ans. $\frac{3\pi}{10}$