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Problems - Calculus II

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1. Evaluate $\int_{\pi/2}^{\pi}\int_{0}^{x^2} \frac{1}{x^2}\cos\frac{y}{x}\,dydx.$

2. Evaluate $\int_{1}^{4}\int_{0}^{\sqrt{y}} e^{x/\sqrt{y}}\,dxdy.$

3. Evaluate $\iint_D e^{-(x^2+y^2)}\,dxdy$ where D is the region between the two circles $x^2+y^2=1$ and $x^2+y^2=4.$

4. Evaluate $\iint_D (x+y)^2\,dxdy$ where D is the parallelogram bounded by the lines $x+y=0,\ x+y=1,\ 2x-y=0$ and $2x-y=3.$

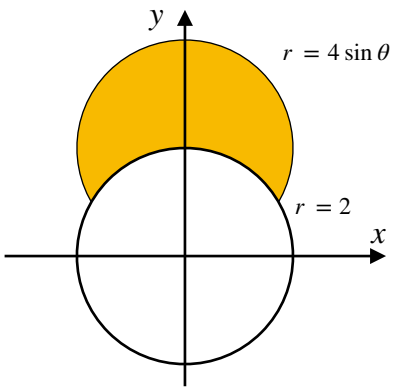
5. Let D be the region in the first quadrant bounded by the hyperbolas $xy=1,\ xy=9$ and the lines $y=x,\ y=4x$. Evaluate

$$\iint_D \left(\sqrt{\frac{y}{x}}+\sqrt{xy}\right)\,dxdy$$

6. Evaluate $\int_{0}^{\frac{\sqrt{\pi}}{2}}\int_{2y}^{\sqrt{\pi}} \sin(x^2)\,dxdy.$

7. Find the volume under $z=\sqrt{4-r^2}$ above the region enclosed by the curve $r=2\cos\theta,\ -\pi/2\leqslant\theta\leqslant\pi/2.$

8. Find the area outside the circle $r=2$ and inside $r=4\sin\theta.$



9. Let D be the region bounded by the lines $y = x,\ y = x - 1,\ x + 2y = 0$ and $x + 2y = 1$. Evaluate

$$\iint_D \frac{x + 2y}{\cos(x - y)}\, dxdy.$$

10. Evaluate $\int_0^2 \int_{y/2}^1 e^{x^2}\, dxdy.$

11. Evaluate the triple integral $\iiint_D 12xy^2z^3 dV$ over the rectangular box D given by $D = \{(x, y, z) \in \mathbb{R}^3 \mid -1 \leqslant x \leqslant 2,\ 0 \leqslant y \leqslant 3,\ 0 \leqslant z \leqslant 2\}.$

12. Find the volume of the solid within the cylinder $x^2 + y^2 = 9$ and between the planes $z = 1$ and $x + z = 5$.

13. Evaluate $\int_C xydx + x^2dy$, where C is the arc of the parabola $y = x^2$ from $(0,0)$ to $(2,4)$, followed by a straight line from $(2,4)$ back to $(0,0)$.

14. Evaluate the line integral of the function $f(x, y, z) = xy + y + z$ along the curve $r(t) = \langle 2t, t, 2 - 2t\rangle$ in the interval $t \in [0,1]$.