

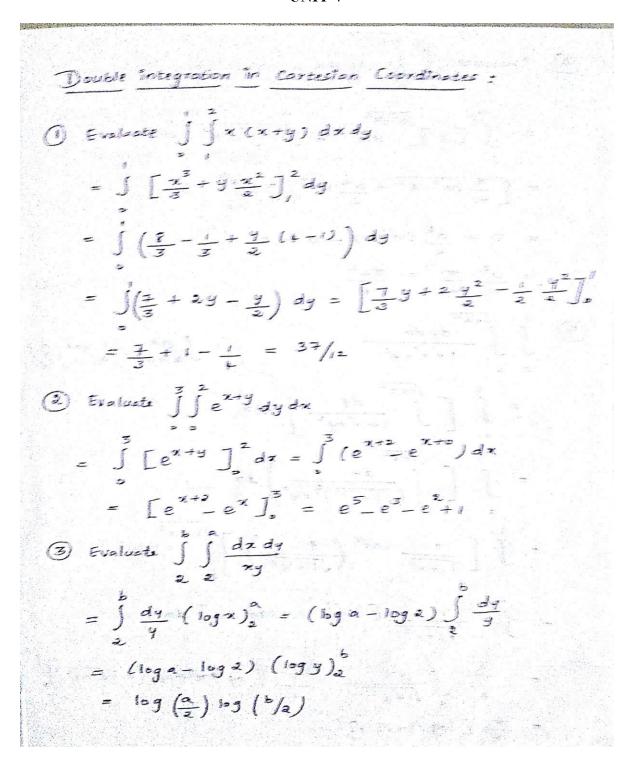
SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution)

DEPARTMENT OF MATHEMATICS

UNIT V





SNS COLLEGE OF TECHNOLOGY



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DEPARTMENT OF MATHEMATICS

(a) Evaluate
$$\int_{0}^{\infty} \int_{0}^{2\pi} dy dx$$

$$= \int_{0}^{\infty} \left[y \right]_{0}^{\infty} dx = \int_{0}^{\infty} \left(\frac{x}{a^{2}} \right)_{0}^{2\pi}$$

$$= \left[\frac{x}{2} \int_{0}^{2\pi} x^{2} + \frac{a^{2}}{2} \sin^{3}\left(\frac{x}{a}\right) \right]_{0}^{2\pi}$$

$$= 0 + \frac{a^{2}}{2} \sin^{3}\left(1\right) - 0 - 0$$

$$= \frac{a^{2}}{2} \frac{\pi}{2} = \frac{\pi a^{2}}{4}$$
(b)
$$\int_{0}^{1+x^{2}} \frac{dy}{1+x^{2}+y^{2}} dx$$

$$= \int_{0}^{1} \left[\int_{0}^{1+x^{2}} \frac{dy}{1+x^{2}+y^{2}} \right] dx$$

$$= \int_{0}^{1} \left[\int_{0}^{1+x^{2}} \frac{dy}{1+x^{2}} \right] dx$$

$$= \int_{0}^{1} \left[\int_{1+x^{2}}^{1+x^{2}} tan^{3}\left(\frac{y}{\sqrt{1+x^{2}}}\right) \right] dx$$

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$$= \frac{\pi}{4} \left[\log\left(1+\sqrt{2}\right) \right]$$

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