1. Sketch the region of integration, and evaluate:

$$a) \int_{-1}^{2}\int_{x^2}^{x+2} dy\,dx \qquad b) \int_{0}^{\pi}\int_{0}^{1-\cos(\theta)} dr\,d\theta$$

2. Same question for:

$$a) \int_{0}^{a}\int_{a-x}^{\sqrt{a^2-x^2}} y\,dy\,dx \qquad b) \int_{0}^{a}\int_{-\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} dy\,dx$$

3. Sketch the region of integration and compute

$$\int_{0}^{\frac{\pi}{2}}\int_{0}^{3\sec(\theta-\frac{\pi}{6})} r\,dr\,d\theta$$

.

4. Without evaluating, find the largest and smallest possible value of

$$\int\int_R \sqrt{1+x^2+y^2}\,dA$$

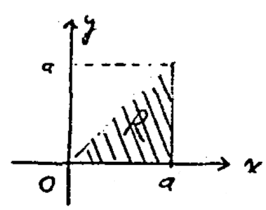
where R is the region bounded by the curves $y = 3x - x^2$ and $y = x^2 - 3x$ (Property 6).

5. Same question for:

$$a) \int_{-3}^{2}\int_{0}^{x+3} xy\,dy\,dx \qquad b) \int_{-2}^{3}\int_{-2}^{x+2} \left(x^2+y^2\right)\,dy\,dx$$

6. Determine $a > 0$ such that

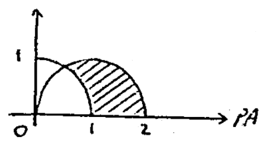
$$\int\int_R \left(x^2+y^2\right)\,dy\,dx = \int\int_R \left(x^2+y^2\right)\,dx\,dy$$



7. Evaluate

$$\int\int_{R_{\theta r}} xy\,dA$$

where $R_{\theta r}$ is the polar region bounded by two circles shown in the Fig.



8. Evaluate

$$\int\int_R \frac{dA}{(x+y)^3}$$

where $R = \{(x, y) : x \geq 1, y \geq 1, x + y < 3\}$

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9. Given