MATH116: QUIZ VI

Name:
Student Number:
Section: 2
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Question:
1) Integrate

$$f(x,y) = \frac{\ln(x^2+y^2)}{\sqrt{x^2+y^2}}$$

over the region $1 \leq x^2 + y^2 \leq e$.

Solution: We use polar coordinates

$$\int_R \int f dA = \int_0^{2\pi} \int_0^{\sqrt{e}} \frac{\ln r^2}{r} r dr d\theta = 2 \int_0^{2\pi} \int_0^{\sqrt{e}} (\ln r) dr d\theta$$

$$= 2 \int_0^{2\pi} (r \ln r - r)|_0^{\sqrt{e}} d\theta = 4\pi(\frac{1}{2} e\sqrt{e} - \sqrt{e}) = 2\pi\sqrt{e}(e-2)$$

2) Evaluate the following integral

$$\int_0^1 \int_y^1 e^{x^2} \, dxdy$$

Solution: Changing the order of integration we get

$$\int_0^1 \int_y^1 e^{x^2} \, dxdy = \int_0^1 \int_0^x e^{x^2} \, dydx = \int_0^1 e^{x^2} \, x \, dx = \frac{1}{2} e^{x^2}|_0^1 = \frac{1}{2}(e-1)$$