"QUIZ" for Lecture 12

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E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q12FirstLast.pdf) ASAP BUT NO LATER THAN Oct. 19 8:00pm

1. Calculate the iterated integral

$$\int_1^2 \int_{-1}^1 (x+y^2)\,dx\,dy \quad .$$

$\int_{-1}^1 (x+y^2)\,dx = \frac{1}{2}x^2 + xy^2 \Big|_{-1}^1 = \left[\frac{1}{2}(1^2) + 1(y^2) - \left(\frac{1}{2}(-1)^2 - 1(y^2)\right)\right] = \frac{1}{2} + y^2 - \left(\frac{1}{2} - y^2\right) = 2y^2$

$\int_1^2 2y^2\,dy = \frac{2}{3}y^3 \Big|_1^2 = \frac{2}{3}(2^3 - 1^3) = \frac{2}{3}(8-1) = \frac{2}{3}(7) = \boxed{\frac{14}{3}}$

2. Calculate the double integral

$$\int\int_R \frac{x^2 y}{x^3+1}\,dA \quad ,$$

$$R = \{(x,y) \mid 0 \le x \le 1,\ -1 \le y \le 1\} \quad .$$

$\int_{-1}^1 \int_0^1 \frac{x^2 y}{x^3+1}\,dx\,dy \Rightarrow \int_0^1 \frac{x^2 y}{x^3+1}\,dx = y\int_0^1 \frac{x^2}{x^3+1}\,dx \quad u = x^3+1,\ du = 3x^2\,dx \Rightarrow \frac{1}{3}y\int_0^1 \frac{du}{u} = \frac{1}{3}y\ln(x^3+1)\Big|_0^1$

$\frac{1}{3}y(\ln 2 - \ln 1) = \frac{1}{3}y\ln 2 \Rightarrow \int_{-1}^1 \frac{1}{3}y\ln 2\,dy = \frac{\ln 2}{3}\int_{-1}^1 y\,dy = \frac{\ln 2}{3}\left(\frac{y^2}{2}\right)\Big|_{-1}^1 = \frac{1}{6}y^2\ln 2$

$\frac{1}{6}\ln 2\,(1^2 - (-1)^2) = \frac{1}{6}\ln 2\,(0) = \boxed{0}$

(i tried both ways but I wanted to make sure)