

"QUIZ" for Lecture 13

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E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q13FirstLast.pdf) ASAP BUT NO LATER THAN Oct. 22, 8:00pm

1. Change the order of integration in

$$\int_1^4 \int_0^{\ln y} f(x, y) dx dy$$

$$0 \leq x \leq \ln y \quad 1 \leq y \leq 4$$

$$\ln 1 = 0 \rightarrow \ln 4 = 1.39$$

$$0 \leq x \leq 1.39$$

$$\frac{1}{e^x} \leq y \leq \frac{4}{e^x}$$

$$\int_0^{1.39} \int_{1/e^x}^{4/e^x} f(x, y) dy dx$$

$$0 \leq x \leq \ln y$$

$$0 \leq e^x \leq y$$

$$0 = e^x \quad y = e^x$$

2. Evaluate

$$\int_0^2 \int_{y/2}^1 \frac{1}{(x^2+1)^2} dx dy$$

by inverting the order of integration and evaluating the new iterated integral.

$$0 \leq y \leq 2$$

$$\frac{y}{2} \leq x \leq 1$$

$$y = 2x$$

$$0 \leq y \leq x$$

$$\frac{y}{2} = \frac{0}{2} = 0$$

$$0 \leq x \leq 1$$

$$= \frac{2}{2} = 1$$

$$\int_0^1 \int_0^x \frac{1}{(x^2+1)^2} dy dx$$

$$\int_0^x \frac{1}{(x^2+1)^2} dy = \frac{(x^2+1)^{-1}}{-1} = \frac{-1}{(x^2+1)}$$

$$\int_0^1 \frac{1}{(x^2+1)^2} dx = \int_0^1 \frac{1}{u} du = \ln u \cdot \frac{1}{2x} = \ln(x^2+1) \cdot \frac{-1}{2x}$$

$$\left(\ln(1^2+1) \cdot \frac{-1}{2} \right) - \left(\ln(0^2+1) \cdot \frac{-1}{0} \right)$$

$\frac{-\ln 2}{2}$

$$u = x^2 + 1$$

$$du = 2x dx$$

$$\frac{1}{2x} du = dx$$