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"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

$$\int_{y=1}^{y=4} \int_{x=0}^{x=\ln(y)} f(x,y) dx dy$$
$$\int_1^4 \int_0^{\ln y} f(x,y) dx dy$$
$$D = \{ (x,y) \mid 0 \leq x \leq \ln(y), 1 \leq y \leq 4 \}$$

$$y = e^x$$

$$1 = e^x \rightarrow x = 0$$

$$4 = e^x \rightarrow x = \ln(4)$$

$$x =$$

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

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.

$$\int_0^2 \int_{y/2}^1 \frac{1}{(x^2+1)^2} dx dy$$
$$D = \{ (x,y) \mid \frac{y}{2} \leq x \leq 1, 0 \leq y \leq 2 \}$$

$$y = 2x$$
$$x = 0 \dots 1$$
$$\int_0^1 \int_0^{2x} \frac{1}{(x^2+1)^2} dy dx \Rightarrow \textcircled{1} \int_0^1 \frac{2x}{(x^2+1)^2} dx$$
$$= \frac{2x}{(x^2+1)^2}$$

$$\rightarrow \int_0^1 \frac{2x dx}{(x^2+1)^2} \quad \text{let } u = x^2+1 \rightarrow [1, 2] \\ du = 2x dx$$

$$\int_1^2 \frac{du}{u^2} = \left[-\frac{1}{u} \right]_1^2 = -\frac{1}{2} - (-1) = \frac{1}{2}$$