

"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

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

inner = type II region

$$D = \{(x, y) \mid 1 \leq y \leq 4, 0 \leq x \leq \ln y\}$$

when  $y=4$ ,  $x = \ln 4$

$$4 = \ln y$$

$$y = e^4$$

$$D = \{(x, y) \mid 0 \leq x \leq \ln 4, 1 \leq y \leq e^x\}$$

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

$$\frac{y}{4} = x \quad y = 4x$$

$$x = \ln y$$

$$y = e^x$$

① solve for  $e^x$  by placing

$$x = \ln y$$

$$\hookrightarrow y = e^x$$

start here and end at 4

② solve for  $\ln$  since  $y=4$  and  $x = \ln y$  so  $x = \ln 4$

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.

$$\textcircled{1} D = \{(x, y) \mid 0 \leq y \leq 2, \frac{y}{2} \leq x \leq 1\}$$

$$\textcircled{1} \frac{y}{2} = x$$

$$y = 2x$$

$$\Rightarrow D = \{(x, y) \mid 0 \leq x \leq 1, 2 \leq y \leq 2x\}$$

$$\textcircled{2} \frac{y}{2} = x$$

$$0 = x$$

$$\textcircled{2} \int_0^1 \int_2^{2x} \frac{1}{(x^2+1)^2} dy dx$$

$$\textcircled{3} \int_2^{2x} \frac{1}{(x^2+1)^2} dy dx = \left. \frac{y}{(x^2+1)^2} \right|_2^{2x} = \frac{2x-2}{(x^2+1)^2}$$

$$\textcircled{4} \int_0^1 \frac{2x-2}{(x^2+1)^2} = -\arctan x - \frac{x+1}{x^2+1} \Big|_0^1 = [\arctan 1 - 1] - [1]$$

$$= -\arctan 1$$