

"QUIZ" for Lecture 13

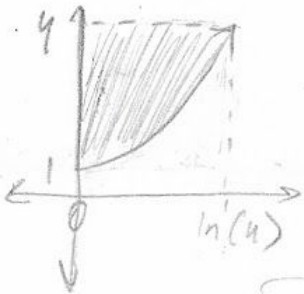
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E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q13FirstLast.pdf) ASAP BUT NO LATER THAN Oct. 22, 8:00pm

1. Change the order of integration in

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

Sketch of $x = \ln y$ (or $y = e^x$) and $x = 0$:



→ The new region would be:

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

So, our new integral is:

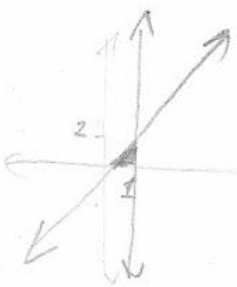
$$\int_0^{\ln(4)} \int_{e^x}^4 f(x, y) dy dx$$

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.

Sketch of $x = \frac{y}{2}$ (or $y = 2x$) and $x = 1$:



→ The new region would be: $R = \{(x, y) \mid 0 \leq y \leq 2x, 0 \leq x \leq 1\}$

Our new integral is $\int_0^1 \int_0^{2x} \frac{1}{(x^2+1)^2} dy dx$

Inside integral first:

$$\int_0^{2x} \frac{1}{(x^2+1)^2} dy = \frac{y}{(x^2+1)^2} \Big|_0^{2x} = \frac{2x}{(x^2+1)^2}$$

Outside integral next:

$$\int_0^1 \frac{2x}{(x^2+1)^2} dx \rightarrow u = x^2+1 \rightarrow \int_1^2 \frac{du}{u^2} = -\frac{1}{u} \Big|_1^2 = -\frac{1}{2} - (-1) = \boxed{\frac{1}{2}}$$