

"QUIZ" for Lecture 15

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E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: qXFirstLast.pdf) ASAP BUT NO LATER THAN Oct. 29, 8:00pm

1. Use polar coordinates to compute the double integral

$$\iint_D xy \, dA \quad ,$$

where

$$D = \{(x, y) \mid x^2 + y^2 \leq 1, x \geq 0, y \geq 0\} \quad .$$

$dydx = r \, dr \, d\theta$ $x^2 + y^2 = r^2$

$x = \sqrt{r^2 - y^2}$
 $y = \sqrt{r^2 - x^2}$

$x = r \cos \theta$
 $y = r \sin \theta$

$\int_0^\pi \int_{r=0}^1 \sqrt{r^2 - y^2} \cdot \sqrt{r^2 - x^2} \, r \, dr \, d\theta$

replace

2. Evaluate the iterated integral by converting it to polar coordinates

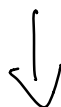
$$\int_0^1 \int_0^{\sqrt{1-y^2}} e^{x^2+y^2} \, dx \, dy \quad .$$

Note: The previous version had a typo ($dy \, dx$ instead of $dx \, dy$, that made it nonsense). I thank Yidi "Wendy" Weng for pointing it out (and see won a dollar).

$$r^2 = x^2 + y^2 \quad x = \sqrt{1-y^2} \quad x^2 = 1-y^2 \quad x^2 + y^2 = 1$$

$$r = 0 \rightarrow 1$$

$$\theta = 0 \rightarrow \pi$$



$$\int_0^{\pi} \int_0^1 e^{r^2} \cdot r \, dr \, d\theta$$

$$u = r^2$$
$$du = 2r \, dr$$

$$\frac{1}{2} \int_0^{\pi} \int_0^1 e^u \, du \, d\theta$$

$$\left. \frac{1}{2} e^{r^2} \right|_0^1$$

$$\frac{1}{2} e$$

$$\int_0^{\pi} \frac{1}{2} e \, d\theta$$

$$\frac{e\theta}{2} \Big|_0^{\pi}$$

$$= \boxed{\frac{\pi e}{2}}$$