"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

$$\int\int_D xy\,dA \quad ,$$

where

$$D = \{(x,y)\,|\,x^2+y^2 \le 1\,,\ x \ge 0\,,\ y \ge 0\} \quad .$$

$\rightarrow \{(r,\theta)\,|\,0 \le \theta \le \frac{\pi}{2},\ 0 \le r \le 1\}$

$\rightarrow \int_0^{\pi/2}\int_0^1 (r\cos\theta)(r\sin\theta)\,r\,dr\,d\theta$

$\rightarrow \int_0^{\pi/2}\int_0^1 r^3\cos\theta\sin\theta\,dr\,d\theta = \int_0^{\pi/2}\cos\theta\sin\theta\,d\theta \cdot \int_0^1 r^3\,dr = \frac{1}{8}$

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 dolllar).

$\rightarrow \{(x,y)\,|\,0 \le y \le 1,\ 0 \le x \le \sqrt{1-y^2}\} \Rightarrow \{(r,\theta)\,|\,0 \le \theta \le \frac{\pi}{2},\ 0 \le r \le 1\}$

$\rightarrow \int_0^{\pi/2}\int_0^1 e^{r^2}\,r\,dr\,d\theta = \frac{\pi(e-1)}{4}$