"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

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

$\int_0^1\int_0^1 xy\ dy\,dx$

$\int_0^1\int_0^1 r^2\cos\theta\sin\theta\ dy\,dx$

$\int_0^1 r^2\cos\theta\sin\theta\ dy$

$\frac{r^2\sin 2\theta}{2}\Big|_0^1$

$\frac{1}{2}\int_0^1 \sin 2\theta\,dx$

$\frac{1}{2}\ -\frac{\cos 2\theta}{2}\Big|_0^1$

$\frac{-\cos(2)+1}{4}$

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).

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

$\frac{e^{x^2+y^2}}{2x}\Big|_0^{\sqrt{1-y^2}}$

$\frac{e}{2\sqrt{1-y^2}}$

$\int_0^1 \frac{e}{2\sqrt{1-y}}\,dy$

$\frac{e}{2}\int_0^1 \frac{1}{\sqrt{1-y}}\,dy$

$\frac{e}{2}\int_0^1 (1-y)^{\frac{1}{2}}$

$\frac{2}{3}(1-y)^{\frac{3}{2}}\Big|_0^1$

$0-\frac{2}{3}$

$\frac{e}{2}\left(-\frac{2}{3}\right) = \frac{-e}{3}$

dy