"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

$$\iint_D xy\,dA$$

where

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

$0 \le \theta \le \frac{\pi}{2}$
$0 \le r \le 1$

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

$\iint_D r^2(\cos\theta\sin\theta) \to \int_0^{\pi/2} r^2(\sin\theta\cos\theta) = \left.\frac{r^4\cos^2\theta}{2}\right|_0^{\pi/2}$

$\int_0^1 \frac{r^2}{2} \to \left.\frac{r^3}{6}\right|_0^1 = \boxed{\frac{1}{6}}$

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

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

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

$0 \le r \le 1$

$0 \le r\sin\theta \le 1$
$\sin\theta = 0 \quad \sin\theta = 1$
$\theta = 0 \quad \theta = \frac{\pi}{2}$

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

$\int_0^{\pi/2} e^{r^2} \to \left.e^{r^2}\theta\right|_0^{\pi/2} =$

$\int_0^1 \frac{\pi e^{r^2}}{2}$ → some really weird integration, even if I do just dr w/ no dθ.