"QUIZ" for Lecture 15

NAME: (print!) Joe Barr **Section:** 24

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

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

$$\int_0^{2\pi}\int_0^1 \frac{\sin(2\theta)}{2}\, r\,dr = \int_0^{2\pi} \frac{\sin(2\theta)}{2}\cdot\frac{1}{2}\,d\theta$$

$$\int_0^{2\pi} \frac{\sin(2\theta)}{4}\,d\theta \Rightarrow u = 2\theta = [0, 4\pi] \Rightarrow \int_0^{2\pi}\frac{\sin(u)}{8}$$

$$du = 2\,d\theta \Rightarrow \frac{du}{2} = d\theta$$

$$\frac{-\cos(u)}{8}\Big|_0^{2\pi}$$

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).

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

$$D = \{(r,\theta)\,|\,0 \le y \le 1 \quad 0 \le x \le \sqrt{1-y^2}\}$$

$$x^2 = 1 - y^2$$

$$\int_0^1 \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} e^{r^2} r \, d\theta \, dr = -\frac{\pi}{2} + \frac{e\pi}{2}$$

MADCF