Quiz 1
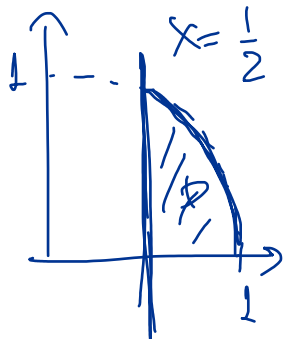
Name: _____

Student ID Number: _____

1. Set up **but do not evaluate** the integral $\iint_D f(x,y)dA$ where $f(x,y) = y^2$ and

$$D = \{(x,y) : x^2 + y^2 \leq 1, x \geq \frac{1}{2} \text{ and } y \geq 0\}$$

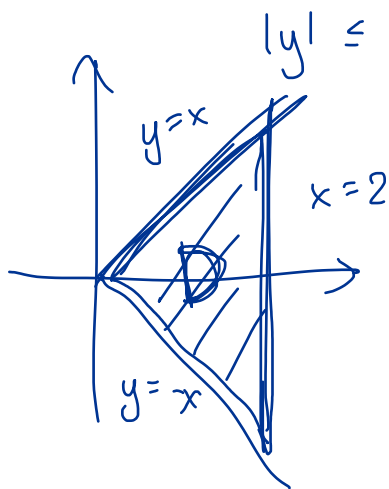**in the order** $dxdy$.

find y-intersection of $x=1$, $x^2+y^2=1$

$$\frac{1}{4} + y^2 = 1 \implies y = \frac{\sqrt{3}}{2}$$

so

$$\iint_D f(x,y)\, dA = \int_0^{\frac{\sqrt{3}}{2}} \int_{\frac{1}{2}}^{\sqrt{1-y^2}} y^2\, dx\, dy$$

2. Set up **but do not evaluate** the integral $\iint_D f(x,y)dA$ **in polar coordinates**, where $f(x,y) = x$ and

$$D = \{(x,y) : |y| \leq x \text{ and } x \leq 2\}.$$

$|y| \leq x \implies -x \leq y \leq x, \quad x \geq 0$

$y = x \implies r\sin\vartheta = r\cos\vartheta$

$\implies \tan\vartheta = 1 \implies \vartheta = \frac{\pi}{4}$

$y = -x \implies \tan\vartheta = -1 \implies \vartheta = -\frac{\pi}{4}$

$x = 2 \implies r\cos\vartheta = 2 \implies r = \frac{2}{\cos\vartheta}$

$$\iint_D f(x,y)\, dA = \int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \int_0^{\frac{2}{\cos\vartheta}} r\cos\vartheta\, r\, dr\, d\vartheta.$$

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