Name: Key

Quiz 7C

MAC2313 L22-L24

1. [5 pts] Compute

$$\iint_D 4xy\, dA$$

where D is the rectangle in polar coordinates $\{(r,\theta):\ 2 \le r \le 4,\ 0 \le \theta \le \frac{\pi}{2}\}$

$\int_0^{\pi/2}\int_2^4 4r^3\cos\theta\sin\theta\, dr\, d\theta =$

$\int_0^{\pi/2} r^4\cos\theta\sin\theta\,\Big|_2^4 d\theta = \int_0^{\pi/2} 240\cos\theta\sin\theta\, d\theta =$

$u = \cos\theta$

$du = -\sin\theta\, d\theta$

$\frac{du}{-\sin\theta} = d\theta$

$\int_0^{\pi/2} -240\, u\, du = -120u^2\Big|_0^{\pi/2} = -120\cos^2\theta\,\Big|_0^{\pi/2} =$

$-120\cos^2\left(\frac{\pi}{2}\right) + 120\cos^2(0) = 120$

2. [5 pts] Compute

$$\iiint_E (y + xz)\, dV$$

where $E = [0,1] \times [1,3] \times [0,2]$.

$\int_0^2\int_1^3\int_0^1 (y+xz)\, dx\, dy\, dz$

$= \int_0^2\int_1^3 xy + \frac{1}{2}x^2z\,\Big|_0^1 dy\, dz = \int_0^2\int_1^3 y + \frac{z}{2}\, dy\, dz =$

$\int_0^2 \frac{1}{2}y^2 + \frac{1}{2}yz\,\Big|_1^3 dz = \int_0^2 \frac{9}{2} + \frac{3}{2}z - \frac{1}{2} - \frac{1}{2}z\, dz =$

$\int_0^2 4 + z\, dz = 4z + \frac{1}{2}z^2\Big|_0^2 = 8 + 2 = 10$