

$$1. \iint_R \delta(x, y) dA = \int_0^{\frac{\pi}{2}} \int_0^1 r^2 \sin \theta dr d\theta = \frac{1}{3}$$

$$2. \iint_R x \delta(x, y) dA$$

$$\iint_R \delta(x, y) dA$$

same with y

$$= \int_0^{\frac{\pi}{2}} \int_0^1 3r^2 \sin \theta dr d\theta$$

$$3. \iint_R y \delta(x, y) dA$$

$$= \frac{3}{8}$$

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

$$= \frac{3}{4}$$

$$3. \frac{1}{A} \iint_R y dA = \frac{1}{\frac{\pi}{4}} \int_0^{\frac{\pi}{2}} \int_0^1 (r \sin \theta) r dr d\theta$$

$$= \frac{4}{3\pi}$$