3. $B = \{ 0 \leq x^2+y^2 \leq 1 \}$ $A = \{ 0 \leq u \leq 1 \}$

$$\iint_A \frac{1}{2\pi} e^{-(u)/2} \cdot \frac{1}{|\det(D_n)|} \, dA$$

$0 \leq \sqrt{u} \leq 1$

$0 \geq \frac{1}{\sqrt{u}} \geq 1$

$$= \int_{v\sqrt{u}}^{0} \int_0^1 \frac{1}{2\pi} e^{-(u)/2} \cdot \frac{1}{|\det(D_n)|} \, du\,dv$$

$\theta \geq \frac{x}{\sqrt{x^2+y^2}} \geq x$

$$= \frac{1}{2\pi} \int \frac{1}{|\det(D_n)|} (1 - e^{-\frac{1}{2}}) \, dv$$

$v \in (x, 0)$

$$= \frac{1}{2\pi} (1-e^{-\frac{1}{2}}) \int_{v\sqrt{u}}^{0} \frac{1}{|\sqrt{1-v^2}|} \, dv$$

take $\det(D_n) = \sqrt{1-v^2}$

$$= \frac{1}{2\pi} (1-e^{-\frac{1}{2}} [\arcsin(v)]_{v\sqrt{u}}^{0}$$

$$\frac{1}{2\pi} \int_0^1 e^{-u/2} [\arcsin(v)]_{v\sqrt{u}}^{0} \, du$$

4. The answers should remain the same as the volume is independent of what coordinate system you use