$\int\int_D \frac{1}{x^2+y^2+1} dA$
$D = \{(x,y) \in \mathbb{R}^2 : 1 \leq x^2+y^2 \leq 16, -x \leq y \leq x\}$

- $1 \leq r \leq 4$
- $\frac{7}{8}\pi \leq \theta \leq \frac{9}{8}$

$\int_1^4 (\int_{\frac{7}{8}\pi}^{\frac{9}{8}\pi} \frac{r}{r^2+1} d\theta) dr$
$\frac{r}{r^2+1}(\frac{9}{8}\pi - \frac{7}{8}\pi) =$
$\frac{r}{r^2+1}(\frac{1}{4}\pi) =$
$\frac{1}{4}\pi \int_1^4 \frac{r}{r^2+1} dr =$
$\int \frac{r}{r^2+1} dr$
$u = r^2+1, du = 2rdr, dr = \frac{du}{2r}$
$\int \frac{r}{r^2+1} dr = \int \frac{r}{u} \frac{du}{2r} =$
$\int \frac{1}{2u} du = \frac{1}{2\ln(u)} + C$
$\Rightarrow \int_1^4 \frac{r}{r^2+1} dr =$
$\frac{1}{2}\ln\left(r^2+1\right)\Big|_1^4 =$
$\frac{1}{2}(\ln(17) - \ln(2))$
$= \frac{\pi}{8}(\ln(17) - \ln(2))$