6.43.

$$\iint_{R^2} f(x,y)\,dxdy = \iint_{D_1} f(x,y)\,dxdy + \iint_{D_2} f(x,y)\,dxdy$$

$$D_1 = \left\{ (x,y) : x^2 + y^2 \le 1 \right\} \;,\; D_2 = \left\{ (x,y) : x^2 + y^2 > 1 \right\}$$

$$f(x,y) = \frac{x^2}{\left(1 + x^2\right)\left(x^2 + y^2\right)^{3/2}}$$

$$0 \le \frac{x^2}{\left(1 + x^2\right)\left(x^2 + y^2\right)^{3/2}} < \frac{x^2}{\left(1 + 0\right)\left(x^2 + y^2\right)^{3/2}} = \frac{x^2}{\left(x^2 + y^2\right)^{3/2}}$$

$$0 \leq \iint_{D_1} f(x,y)\,dxdy < \iint_{D_1} \frac{x^2}{\left(x^2+y^2\right)^{3/2}}\,dxdy$$

$$\iint_{D_1} \frac{x^2}{\left(x^2+y^2\right)^{3/2}}\,dxdy = \iint_{D_{1r\theta}} \frac{r^2\cos^2\theta}{\left(r^2\right)^{3/2}}\,rdrd\theta = \pi \quad 1 = \pi$$

$\iint_{D_1} f(x,y)\,dxdy$ är konvergent.

$$0 \leq \frac{x^2}{\left(1+x^2\right)\left(x^2+y^2\right)^{3/2}} < \frac{x^2}{\left(0+x^2\right)\left(x^2+y^2\right)^{3/2}} = \frac{1}{\left(x^2+y^2\right)^{3/2}}$$

$$0 \le \iint_{D_2} f(x,y)\,dxdy < \iint_{D_2} \frac{1}{\left(x^2+y^2\right)^{3/2}}\,dxdy$$

$$\iint_{D_2} \frac{1}{\left(x^2+y^2\right)^{3/2}}\,dxdy = \iint_{D_{2r\theta}} \frac{1}{\left(r^2\right)^{3/2}}\,rdrd\theta = 2\pi \quad 1 = 2\pi$$

$$\iint_{D_2} f(x,y)\,dxdy \text{ är konvergent.}$$

SVAR:

$$\iint_{R^2} \frac{x^2}{\left(1+x^2\right)\left(x^2+y^2\right)^{3/2}}\,dxdy \text{ är konvergent.}$$