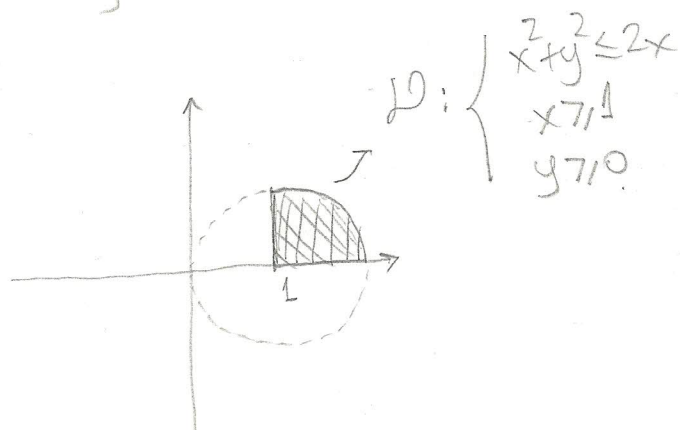
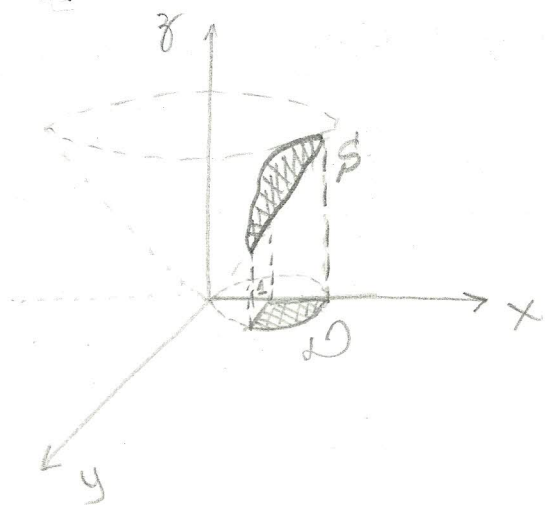


4. (2.0) Calcule a área da superfície $z = \sqrt{x^2 + y^2}$, para $x^2 + y^2 \leq 2x$, $x \geq 1$ e $y \geq 0$.



$$z = f(x,y) = \sqrt{x^2 + y^2}$$

$$x^2 + y^2 \leq 2x \Leftrightarrow x^2 + y^2 - 2x \leq 0 \Leftrightarrow$$

$$\Leftrightarrow x^2 - 2x + 1 + y^2 \leq 1 \Leftrightarrow$$

$$\Leftrightarrow (x-1)^2 + y^2 \leq 1$$

$$f(x,y) = \sqrt{x^2 + y^2} = (x^2 + y^2)^{1/2}$$

$$f_x(x,y) = \frac{x}{\sqrt{x^2 + y^2}}; f_y(x,y) = \frac{y}{\sqrt{x^2 + y^2}}$$

$$\text{Área}(S) = \iint_D \sqrt{f_x^2(x,y) + f_y^2(x,y) + 1} \, dA = \iint_D \sqrt{\frac{x^2}{x^2 + y^2} + \frac{y^2}{x^2 + y^2} + 1} \, dA =$$

$$= \iint_D \sqrt{\frac{x^2 + y^2}{x^2 + y^2} + 1} \, dA = \iint_D \sqrt{2} \, dA = \sqrt{2} \iint_D 1 \, dA =$$

$$= \sqrt{2} \cdot \text{Área}(D) = \sqrt{2} \left(\frac{1}{4} \text{Área do Círculo de raio 1} \right) \Rightarrow$$

$$\boxed{\text{Área}(S) = \frac{\sqrt{2}\pi}{4}}$$