Aula 206 1.4 - 5b

Daniel Amorim Vilela de Salis - 123.145

- Laplaciano: $\nabla^2 \varphi = \frac{\partial^2 \varphi}{\partial^2 x} + \frac{\partial^2 \varphi}{\partial^2 y}$

- $\frac{\partial(\ln(x^2+y^2))}{\partial x} + \frac{\partial(\ln(x^2+y^2))}{\partial y} = \frac{2x}{x^2+y^2} + \frac{2y}{x^2+y^2}$

- $\nabla^2 \varphi = \frac{\partial\left(\frac{2x}{x^2+y^2}\right)}{\partial x} + \frac{\partial\left(\frac{2y}{x^2+y^2}\right)}{\partial y} = \frac{2(x^2+y^2)-(2x)(2x)}{(x^2+y^2)^2} + \left(\frac{2(x^2+y^2)-4y^2}{(x^2+y^2)^2}\right) \Rightarrow$

$$\nabla^2 \varphi = \frac{2x^2+2y^2-4x^2}{(x^2+y^2)^2} + \frac{2x^2+2y^2-4y^2}{(x^2+y^2)^2} \Rightarrow$$

$$\nabla^2 \varphi = \frac{2y^2-2x^2}{(x^2+y^2)} + \frac{2x^2-2y^2}{(x^2+y^2)^2} = 0$$

- Portanto o laplaciano será 0