Aula 08 - 10.1/1j

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- Calculando derivadas parciais em x:

$$\frac{\partial z}{\partial x} = \frac{\partial (x^2+y^2)\ln(x^2+y^2)}{\partial x} = \ln(x^2+y^2) \cdot \underbrace{\frac{\partial(x^2+y^2)}{\partial x}}_{\mathrm{I}} + (x^2+y^2) \cdot \underbrace{\frac{\partial \ln(x^2+y^2)}{\partial x}}_{\mathrm{II}}$$

- Resolvendo I:

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

- Resolvendo II:

$$\ln(u)' = \frac{1}{u} u' \quad \therefore \quad \frac{\partial \ln(x^2+y^2)}{\partial x} = \frac{1}{x^2+y^2} \cdot \frac{\partial(x^2+y^2)}{\partial x} = \frac{2x}{x^2+y^2}$$

$$\therefore \frac{\partial z}{\partial x} = 2 \cdot x \ln(x^2+y^2) + (x^2+y^2) \cdot \frac{2x}{x^2+y^2}$$

$$\boxed{\frac{\partial z}{\partial x} = 2x \ln(x^2+y^2) + 2x = 2x(\ln(x^2+y^2)+1)}$$

- Calculando em relação a y:

$$\frac{\partial z}{\partial y} = \frac{\partial (x^2+y^2) \cdot \ln(x^2+y^2)}{\partial y} = \ln(x^2+y^2) \cdot \underbrace{\frac{\partial(x^2+y^2)}{\partial y}}_{\mathrm{III}} + (x^2+y^2) \cdot \underbrace{\frac{\partial \ln(x^2+y^2)}{\partial y}}_{\mathrm{IV}}$$

III: $$\frac{\partial(x^2+y^2)}{\partial y} = 2y$$

IV: Pelas mesmas propriedades vistas acima temos:

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

- Substituindo, temos: $$\frac{\partial z}{\partial y} = 2 \ln(x^2+y^2) + (x^2+y^2) \cdot \frac{2y}{x^2+y^2}$$

$$\boxed{\therefore \quad \frac{\partial z}{\partial y} = 2y(\ln(x^2+y^2)+1)}$$

Então a resposta fica: $\frac{\partial z}{\partial x} = 2x(\ln(x^2+y^2)+1)$ e $\frac{\partial z}{\partial y} = 2y(\ln(x^2+y^2)+1)$