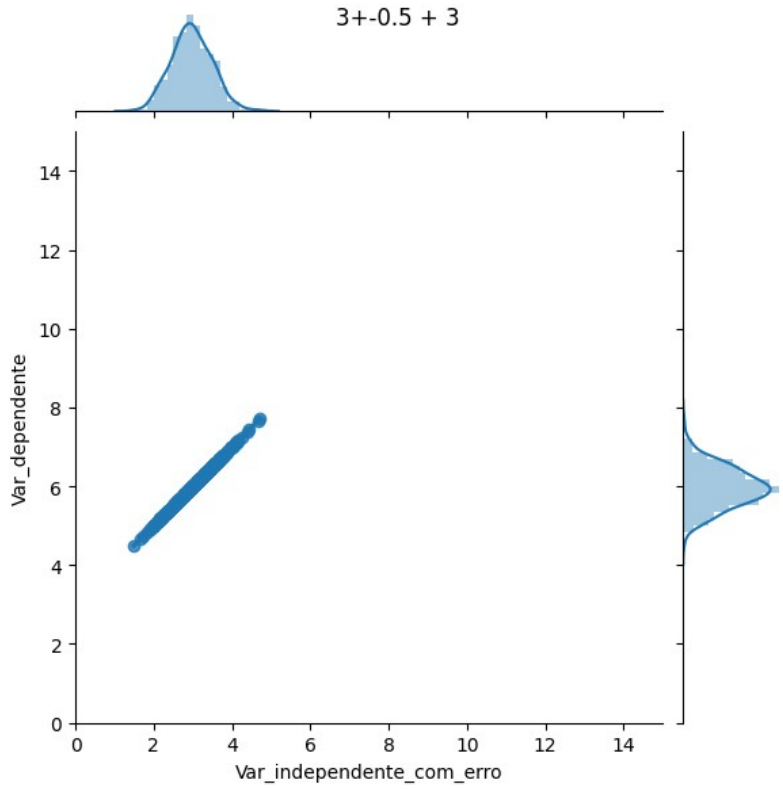
Propagação de erros 1

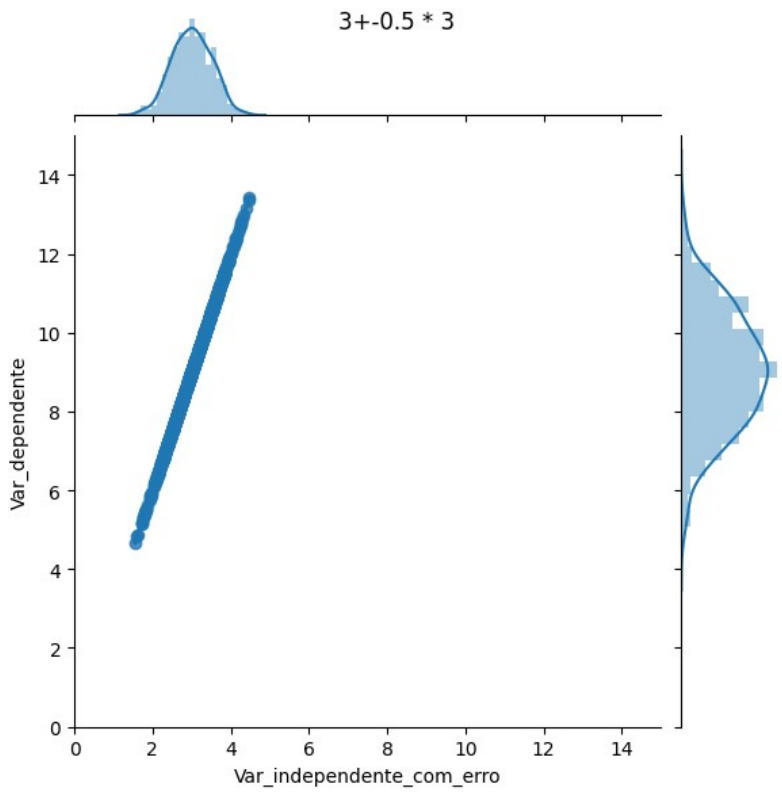
Fórmula geral
Soma e subtração de constante
Multiplicação e divisão de constante
Covariância e erros
Propagação de erros - mais de uma variável

Prof. Renato Paes de Almeida
Instituto de Geociências
Universidade de São Paulo

$$\Delta Z^2 = \left(\frac{\delta f(X,Y)}{\delta X}\Delta X\right)^2 + \left(\frac{\delta f(X,Y)}{\delta Y}\Delta Y\right)^2$$

Soma dos quadrados das derivadas parciais vezes o erro da variável





Premissa das fórmulas gerais:
Os erros de cada variável não são correlacionados

Variância:

$$\sigma_A^2 = \frac{1}{n} \sum (x_i - \bar{x})^2$$

Covariância:

$$\sigma_{AB} = \frac{1}{n} \sum (x_i - \bar{x})(y_i - \bar{y})$$

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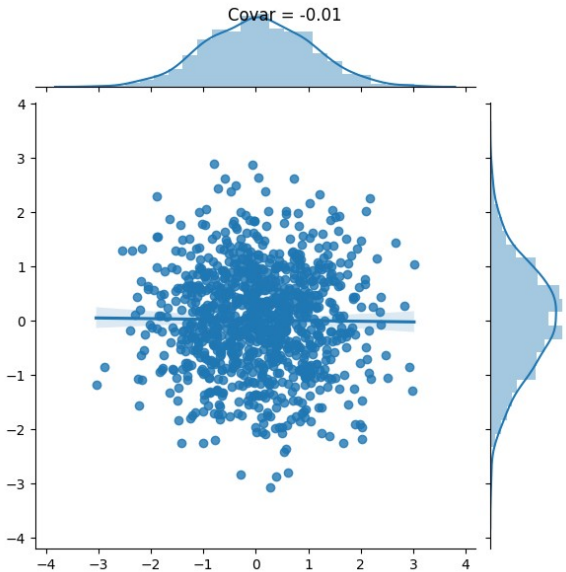
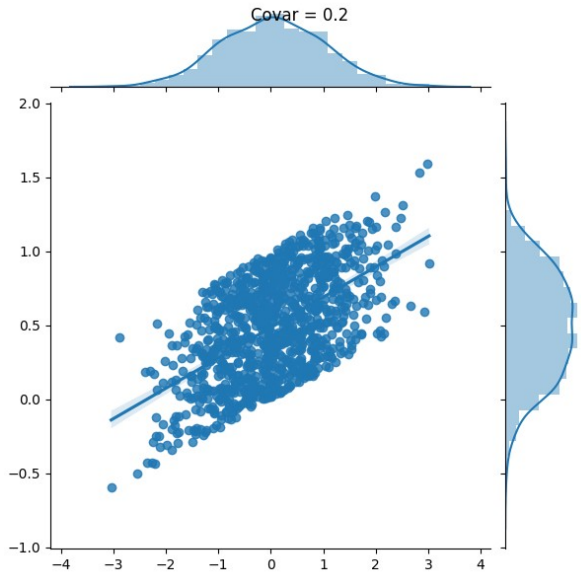
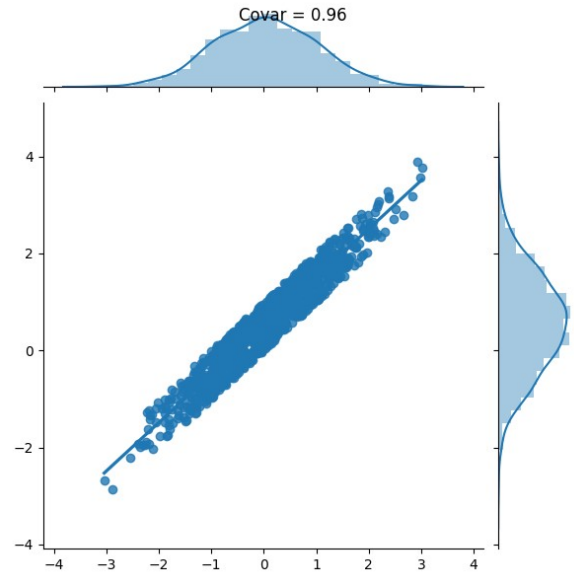
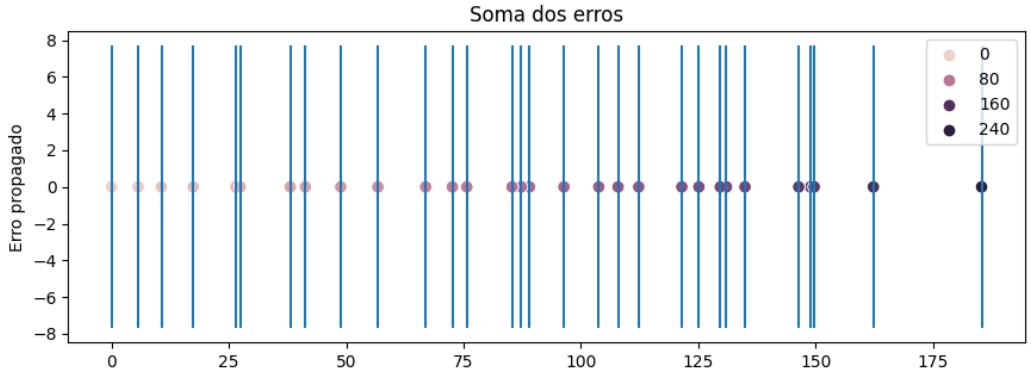






$$\mathbf{z = x + y}$$
$$\mathbf{z = x - y}$$

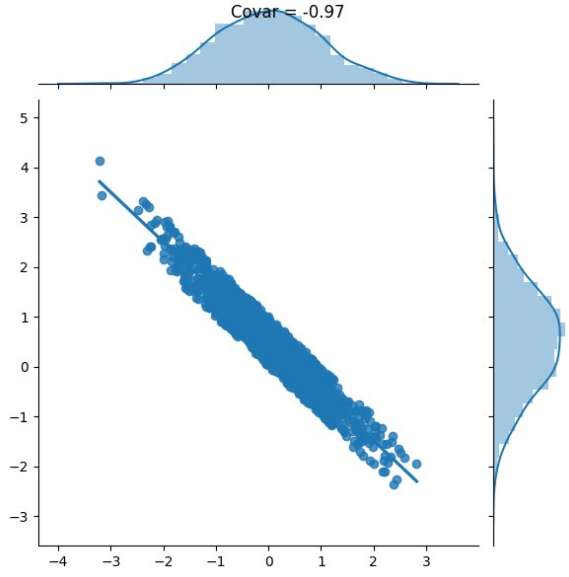
$$\sigma \mathbf{z} = \sqrt{\sigma \mathbf{x^2} + \sigma \mathbf{y^2}}$$



$$\textbf{para } \sigma_{\mathbf{xy}} \neq \mathbf{0}$$

$$\sigma \mathbf{z} = \sqrt{\sigma \mathbf{x^2} + \sigma \mathbf{y^2} + \mathbf{2}\sigma_{\mathbf{xy}}}$$

$$\sigma \mathbf{z} = \sqrt{\sigma \mathbf{x^2} + \sigma \mathbf{y^2} - \mathbf{2}\sigma_{\mathbf{xy}}}$$

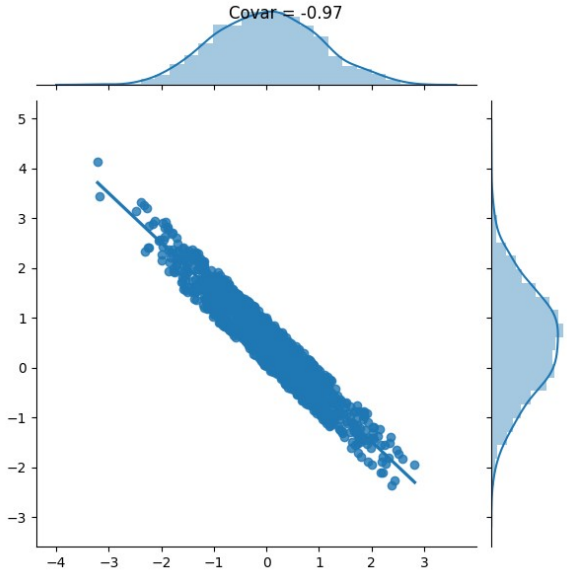


$$Z = X * Y \qquad Z = \frac{X}{Y} \qquad \sigma z = z\sqrt{\left(\frac{\sigma x}{x}\right)^2 + \left(\frac{\sigma y}{y}\right)^2}$$

para $\sigma_{xy} \neq 0$

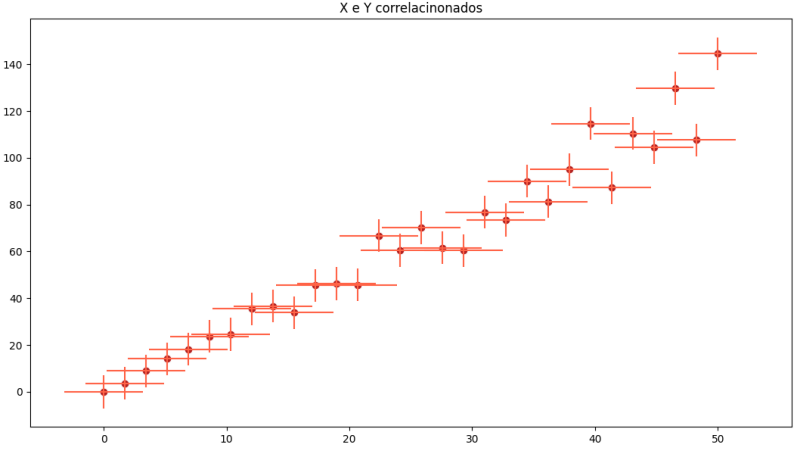
$$\sigma z = z\sqrt{\left(\frac{\sigma x}{x}\right)^2 + \left(\frac{\sigma y}{y}\right)^2 + \frac{2\sigma_{xy}}{xy}}$$

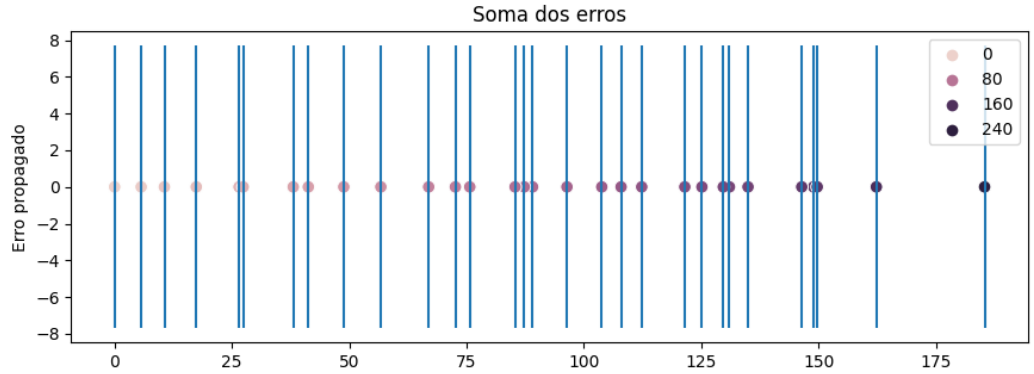
$$\sigma z = z\sqrt{\left(\frac{\sigma x}{x}\right)^2 + \left(\frac{\sigma y}{y}\right)^2 - \frac{2\sigma_{xy}}{xy}}$$

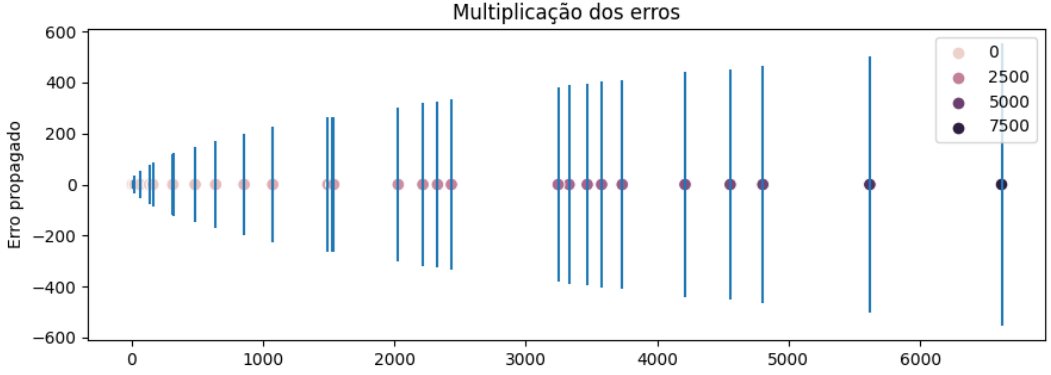


$$Z = X * Y \qquad Z = \frac{X}{Y}$$

$$\frac{\Delta Z}{Z} = \sqrt{\left(\frac{\Delta X}{X}\right)^2 + \left(\frac{\Delta Y}{Y}\right)^2}$$

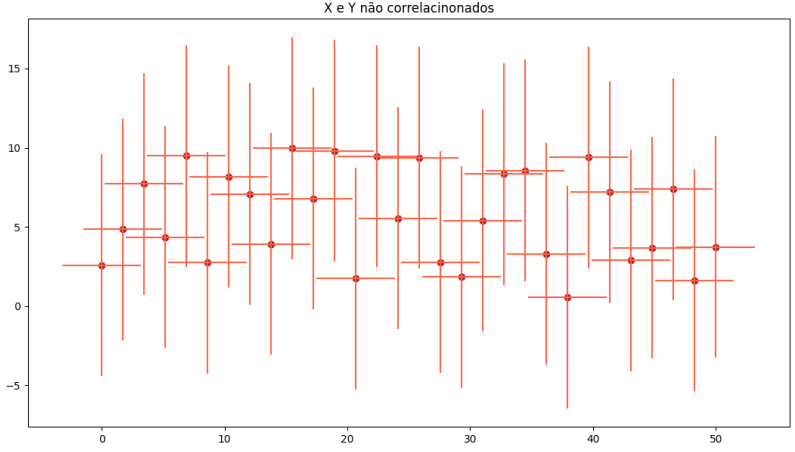


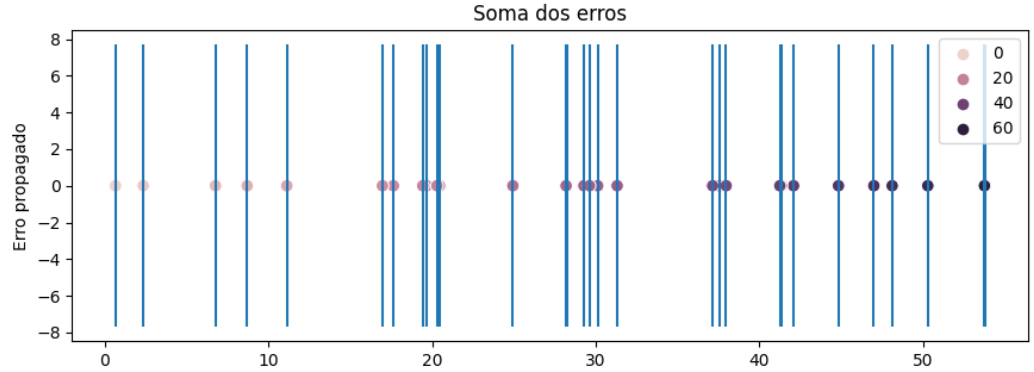


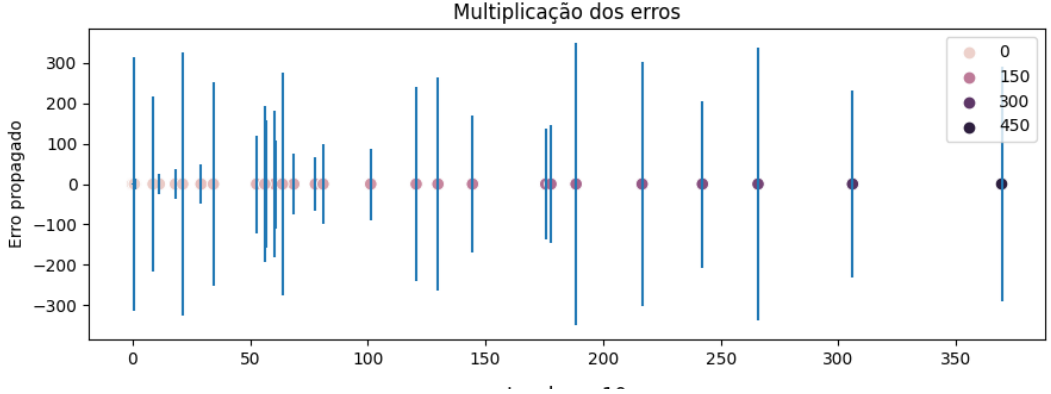


$$Z = X * Y \qquad Z = \frac{X}{Y}$$

$$\frac{\Delta Z}{Z} = \sqrt{\left(\frac{\Delta X}{X}\right)^2 + \left(\frac{\Delta Y}{Y}\right)^2}$$







$$Z = ln(X)$$

$$\Delta Z = \left| \frac{\delta ln(X)}{\delta X} \Delta X \right|$$

$$\Delta Z = \left| \frac{\Delta X}{X} \right|$$

$$Z = e^X$$

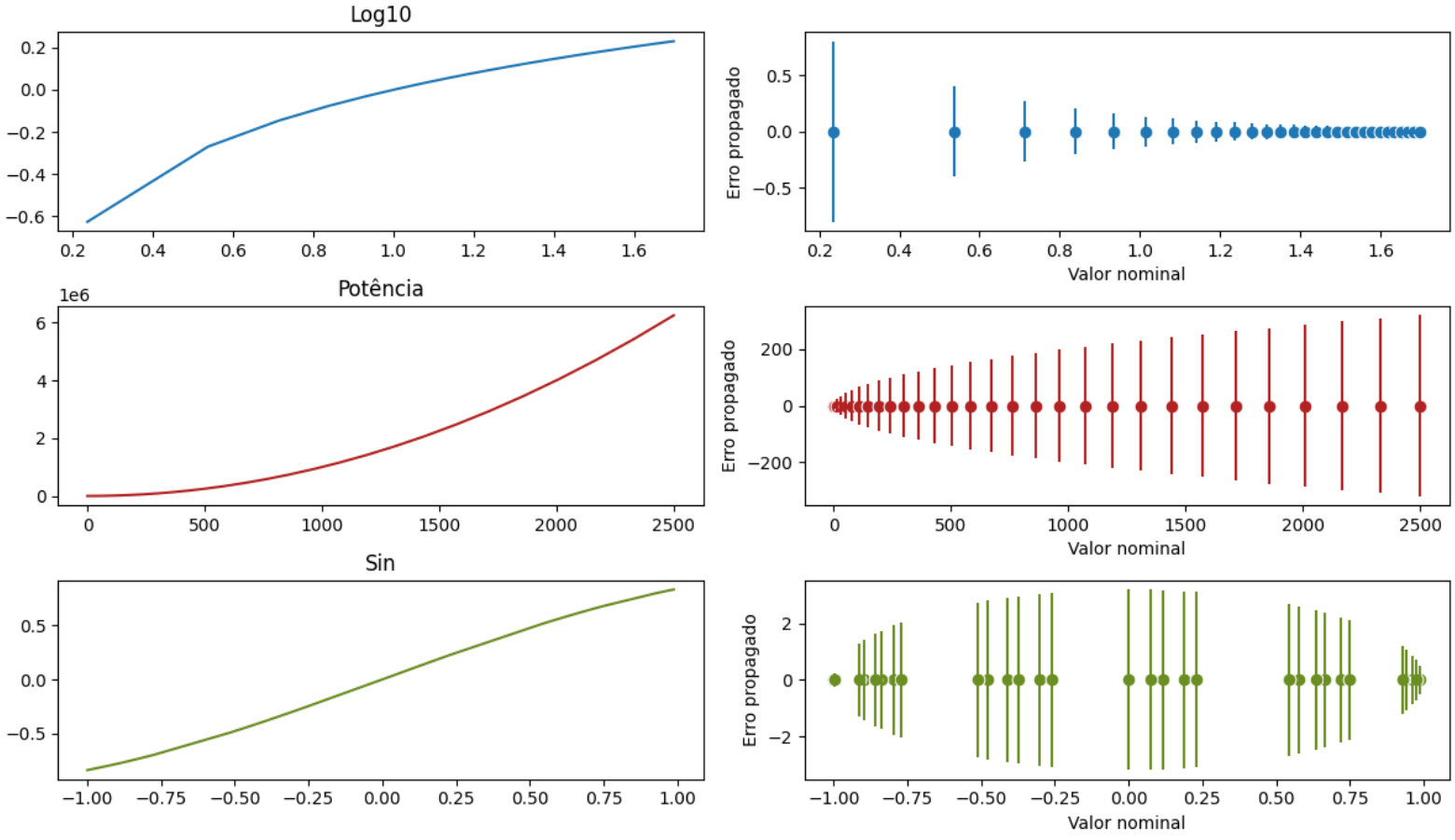
$$\Delta Z = \left| \frac{\delta e^X}{\delta X} \Delta X \right|$$

$$\Delta Z = \left| e^X \Delta X \right|$$

$$Z = sen(X)$$

$$\Delta Z = \left| \frac{\delta sen(X)}{\delta X} \Delta X \right|$$

$$\Delta Z = |cos(X) \Delta X|$$


Log10
Erro propagado
Valor nominal
Potência
1e6
Erro propagado
Valor nominal
Sin
Erro propagado
Valor nominal