Aula 10

5 Novembro

Derivadas das funções trigonométricas

$\operatorname{sen}' x = \cos x$ $\qquad\qquad$ $\cos' x = -\operatorname{sen} x$

$$\operatorname{tg}' x = \left(\frac{\operatorname{sen} x}{\cos x}\right)' = \frac{\cos x \cos x - \operatorname{sen} x(-\operatorname{sen} x)}{\cos^2 x}$$

$$= \frac{\cos^2 x + \operatorname{sen}^2 x}{\cos^2 x} =$$

$$= \frac{1}{\cos^2 x} = \sec^2 x$$

De modo análogo, podemos deduzir que

$$\operatorname{cotg}' x = -\operatorname{cosec}^2 x$$

$$\sec' x = \sec x \operatorname{tg} x$$

$$\operatorname{cosec}' x = -\operatorname{cosec} x \operatorname{cotg} x$$

Derivadas das funções hiperbólicas

$$\operatorname{sh}' x = \left(\frac{e^x - e^{-x}}{2}\right)' = \frac{e^x + e^{-x}}{2} = \operatorname{ch} x$$

$$\operatorname{ch}' x = \left(\frac{e^x + e^{-x}}{2}\right)' = \frac{e^x - e^{-x}}{2} = \operatorname{sh} x$$

$$\operatorname{th}' x = \left(\frac{\operatorname{sh} x}{\operatorname{ch} x}\right)' = \frac{\operatorname{ch} x \cdot \operatorname{ch} x - \operatorname{sh} x \operatorname{sh} x}{\operatorname{ch}^2 x}$$

$$= \frac{\operatorname{ch}^2 x - \operatorname{sh}^2 x}{\operatorname{ch}^2 x} = \frac{1}{\operatorname{ch}^2 x}$$

De modo análogo se deduz que:

$$\operatorname{coth}' x = \frac{-1}{\operatorname{sh}^2 x}$$

$$\operatorname{sech}' x = -\operatorname{sech} x \operatorname{th} x$$

$$\operatorname{cosech}' x = -\operatorname{cosech} x \cdot \operatorname{coth} x$$