**[Importante: Cite os resultados que você utilizar na resolução dos exercícios!]**

**Exercício 1.** Encontre a derivada das funções abaixo e simplifique o máximo possível.

(i) $\tanh(1+e^{2x})$;

(ii) $\cosh(\ln(x))$;

(iii) $\operatorname{senh}(\cosh(x))$;

(iv) $\operatorname{cossech}(x)(1-\ln(\operatorname{cossech}(x)))$;

(v) $\sqrt[4]{\dfrac{1+\tanh(x)}{1-\tanh(x)}}$;

(vi) $x\operatorname{cotanh}(1+x^2)$;

(vii) $x^2\operatorname{senh}^{-1}(2x)$;

(viii) $x\operatorname{senh}(x)-\cosh(x)$;

(ix) $\tan^{-1}(\tanh(x))$;

(x) $\operatorname{sech}^2(e^x)$;

(xi) $\ln(\cosh(x))$;

(xii) $x\operatorname{senh}^{-1}\left(\dfrac{x}{3}\right)-\sqrt{9+x^2}$;

(xiii) $e^{\cosh(3x)}$;

(xiv) $\tanh^{-1}(\sqrt{x})$;

(xv) $x\tanh^{-1}(x)+\ln(\sqrt{1-x^2})$;

(xvi) $\operatorname{cotanh}^{-1}(\sqrt{x^2+1})$;

(xvii) $\operatorname{sech}^{-1}(1-x^2), x>0$;

(xviii) $x\operatorname{senh}^{-1}\left(\dfrac{x}{3}\right)-\sqrt{9+x^2}$.

**Exercício 2.** Prove as identidades abaixo.

(i) $\operatorname{senh}(2x)=2\operatorname{senh}(x)\cosh(x)$;

(ii) $\cosh(x)+\operatorname{senh}(x)=e^x$;

(iii) $\tanh(\ln(x))=\dfrac{x^2-1}{x^2+1}$;

(iv) $\cosh(2x)=\cosh^2(x)+\operatorname{senh}^2(x)$;

(v) $\cosh(x)-\operatorname{senh}(x)=e^{-x}$;

(vi) $\dfrac{1+\tanh(x)}{1-\tanh(x)}=e^{2x}$.

**Exercício 3.** Prove as seguintes identidades:

(i) $\operatorname{senh}(-x)=-\operatorname{senh}(x)$;

(ii) $\cosh(-x)=\cosh(x)$;

(iii) $\operatorname{senh}(x+y)=\operatorname{senh}(x)\cosh(y)+\operatorname{senh}(y)\cosh(x)$;

(iv) $\cosh(x+y)=\cosh(x)\cosh(y)+\operatorname{senh}(x)\operatorname{senh}(y)$.

**Exercício 4.** Mostre que:

(i) $(\operatorname{senh}(x))'=\cosh(x)$;

(ii) $(\cosh(x))'=\operatorname{senh}(x)$;

(iii) $(\tanh(x))'=\operatorname{sech}^2(x)$;

(iv) $(\operatorname{cossech}(x))'=-\operatorname{cossech}(x)\operatorname{cotanh}(x)$;

(v) $(\operatorname{sech}(x))'=-\operatorname{sech}(x)\tanh(x)$;

(vi) $(\operatorname{cotanh}(x))'=-\operatorname{cossech}^2(x)$.

**Exercício 5.** Se $x=\ln(\sec(\theta)+\tan(\theta))$, mostre que $\sec(\theta)=\cosh(x)$.