Eseguire i seguenti **esercizi riassuntivi** *di derivazione, dimostrando che si ha:*

1. $D\left[\frac{1}{15}\cos^3 x(3\cos^2 x - 5)\right] = \operatorname{sen}^3 x \cos^2 x.$

2. $D\operatorname{tg}\frac{1-e^x}{1+e^x} = -\frac{2e^x}{(1+e^x)^2}\sec^2\left(\frac{1-e^x}{1+e^x}\right).$

3. $D\frac{\ln \operatorname{sen} x}{\ln \cos x} = \frac{\operatorname{ctg} x \ln\cos x + \operatorname{tg} x \ln \operatorname{sen} x}{\ln^2 \cos x}.$

4. $D(\operatorname{arcsen} x + \sqrt{1-x^2}) = \sqrt{\frac{1-x}{1+x}}.$

5. $D\ln\frac{x+\sqrt{1-x^2}}{x} = -\frac{1}{x\sqrt{1-x^2}(x+\sqrt{1-x^2})}.$

6. $D\operatorname{sen}^2\left(\frac{1-\ln x}{x}\right) = \frac{\ln x - 2}{x^2}\operatorname{sen}\left[2\left(\frac{1-\ln x}{x}\right)\right].$

7. $D[\ln(\sqrt{1+e^x}-1) - \ln(\sqrt{1+e^x}+1)] = \frac{1}{\sqrt{e^x+1}}.$

8. $D\operatorname{sen}\sqrt{1-2^x} = -\frac{\cos\sqrt{1-2^x}}{2\sqrt{1-2^x}}2^x \ln 2.$

9. $D\left[\frac{a}{2}\left(e^{\frac{x}{a}} - e^{-\frac{x}{a}}\right)\right] = \frac{1}{2}\left(e^{\frac{x}{a}} + e^{-\frac{x}{a}}\right).$

10. $Da^{\operatorname{tg} nx} = na^{\operatorname{tg} nx} \cdot \sec^2 nx \cdot \ln a.$

11. $D\ln\frac{1}{x+\sqrt{x^2-1}} = -\frac{1}{\sqrt{x^2-1}}.$

12. $D\sqrt{a\operatorname{sen}^2 x + b\cos^2 x} = \frac{(a-b)\operatorname{sen} 2x}{2\sqrt{a\operatorname{sen}^2 x + b\cos^2 x}.}$

13. $D\operatorname{arcsen}\frac{x^2-1}{x^2} = \frac{2}{x\sqrt{2x^2-1}}.$

14. $D\frac{\arccos x}{\sqrt{1-x^2}} = \frac{x\arccos x - \sqrt{1-x^2}}{\sqrt{(1-x^2)^3}}.$

15. $D\left[\frac{1}{2}\ln\operatorname{tg}\frac{x}{2} - \frac{1}{2}\frac{\cos x}{\operatorname{sen}^2 x}\right] = \frac{1}{\operatorname{sen}^3 x}.$

16. $D(\operatorname{arcsen} x^2 + \arccos x^2) = 0.$

17. $D\left[\frac{1}{2}(\operatorname{arcsen} x)^2 \arccos x\right] = \frac{1}{2}\frac{\operatorname{arcsen} x(2\arccos x - \operatorname{arcsen} x)}{\sqrt{1-x^2}}.$

19. $D[x-\ln(2e^x+1+\sqrt{e^{2x}+4e^x+1})]=\dfrac{1}{\sqrt{e^{2x}+4e^x+1}}$.

20. $D[\ln(x\operatorname{sen}x\sqrt{1-x^2})]=\dfrac{1}{x}-\dfrac{x}{1-x^2}+\operatorname{ctg}x$.

21. $D\sqrt[5]{(1+xe^{\sqrt{x}})^3}=\dfrac{3e^{\sqrt{x}}(2+\sqrt{x})}{10\sqrt[5]{(1+xe^{\sqrt{x}})^2}}$.

22. $D[\ln(e^x+5\operatorname{sen}x-4\operatorname{arcsen}x)]=\dfrac{(e^x+5\cos x)\sqrt{1-x^2}-4}{(e^x+5\operatorname{sen}x-4\operatorname{arcsen}x)\sqrt{1-x^2}}$.

23. $D[\operatorname{arctg}(\ln x)+\ln(\operatorname{arctg}x)]=\dfrac{1}{(1+\ln^2 x)\cdot x}+\dfrac{1}{(1+x^2)\operatorname{arctg}x}$.

24. $D\operatorname{arcsen}\dfrac{x}{\sqrt{1+x^2}}=\dfrac{1}{1+x^2}$.

25. $D\left[\dfrac{1}{\sqrt{b}}\operatorname{arcsen}\left(x\sqrt{\dfrac{b}{a}}\right)\right]=\dfrac{1}{\sqrt{a-bx^2}}$.

26. $D\left(\sqrt{a^2-x^2}+a\cdot\operatorname{arcsen}\dfrac{x}{a}\right)=\sqrt{\dfrac{a-x}{a+x}}$.

27. $D\left(x\sqrt{a^2-x^2}+a^2\cdot\operatorname{arcsen}\dfrac{x}{a}\right)=2\sqrt{a^2-x^2}$

28. $D\left(2\operatorname{arcsen}\dfrac{x-2}{\sqrt{6}}-\sqrt{2+4x-x^2}\right)=\dfrac{x}{\sqrt{2+4x-x^2}}$.

29. $D\ln\cos\left(\operatorname{arctg}\dfrac{e^x-e^{-x}}{2}\right)=\dfrac{e^{-x}-e^x}{e^{-x}+e^x}$.

30. $D\left[\ln\sqrt[4]{\dfrac{x^2+x+1}{x^2-x+1}}+\dfrac{1}{2\sqrt{3}}\left(\operatorname{arctg}\dfrac{2x+1}{\sqrt{3}}+\operatorname{arctg}\dfrac{2x-1}{\sqrt{3}}\right)\right]=\dfrac{1}{x^4+x^2+1}$.

31. $D\left(\dfrac{x\operatorname{arcsen}x}{\sqrt{1-x^2}}+\ln\sqrt{1-x^2}\right)=\dfrac{\operatorname{arcsen}x}{(1-x^2)\sqrt{1-x^2}}$.

32. $D\left(\dfrac{\sqrt{2}}{3}\operatorname{arctg}\dfrac{x}{\sqrt{2}}+\dfrac{1}{6}\ln\dfrac{x-1}{x+1}\right)=\dfrac{x^2}{x^4+x^2-2}$.

33. $D\left[\ln\left(\dfrac{1+x}{1-x}\right)^{\frac{1}{4}}-\dfrac{1}{2}\operatorname{arctg}x\right]=\dfrac{x^2}{1-x^4}$.

34. $D\left[\operatorname{arctg}\dfrac{a}{x}+\ln\sqrt{\dfrac{x-a}{x+a}}\right]=\dfrac{2a^3}{x^4-a^4}$.

35. $D\left(\sqrt{a^2-x^2}+a\cdot\operatorname{arcsen}\dfrac{x}{a}\right)=\sqrt{\dfrac{a-x}{a+x}}$.

36. $D\left(x\sqrt{a^2-x^2}+a^2\cdot\operatorname{arcsen}\dfrac{x}{a}\right)=2\sqrt{a^2-x^2}$.

37. $D\left(\ln\operatorname{arcsen}x+\dfrac{1}{2}\ln^2 x+\operatorname{arcsen}\ln x\right)=\dfrac{1}{(\operatorname{arcsen}x)\sqrt{1-x^2}}+\dfrac{\ln x}{x}+\dfrac{1}{x\sqrt{1-\ln^2 x}}$.

38. $D[\ln(\sqrt{1+e^x}-1)-\ln(\sqrt{1+e^x}+1)]=\dfrac{1}{\sqrt{1+e^x}}$.

39. $D\dfrac{1}{\sqrt{3}}\ln\dfrac{\operatorname{tg}\dfrac{x}{2}+2-\sqrt{3}}{\operatorname{tg}\dfrac{x}{2}+2+\sqrt{3}}=\dfrac{1}{1+2\operatorname{sen}x}$.