Bestimme jeweils die Ableitungsfunktion - Lösung!

1. $f(x) = \sin\left(\frac{1}{3}x^3\right) \rightarrow f'(x) = \cos\left(\frac{1}{3}x^3\right) \cdot x^2 = \underline{\underline{x^2 \cos\left(\frac{1}{3}x^3\right)}}$

2. $g(x) = \left(x^{-2}\right)^5 = x^{-10} \rightarrow g'(x) = \underline{\underline{-10x^{-11}}}$

3. $h(x) = \cos 2x \rightarrow h'(x) = -\sin 2x \cdot 2 = \underline{\underline{-2\sin 2x}}$

4. $k(x) = \left(1 - sx^2\right)^3 \rightarrow k'(x) = 3 \cdot \left(1 - sx^2\right)^2 \cdot (-2sx) = \underline{\underline{-6sx \cdot \left(1 - x^2\right)^2}}$

5. $l(x) = \sqrt{2kx} \rightarrow l'(x) = \frac{1}{2\sqrt{2kx}} \cdot 2k = \underline{\underline{\frac{k}{\sqrt{2kx}}}}$

6. $m(x) = \sin^2 x \rightarrow m'(x) = \underline{\underline{2\sin x \cdot \cos x}}$

7. $f'(x) = \cos 2x \cdot 2 \cdot x + \sin 2x \cdot 1 = \underline{\underline{2x\cos 2x + \sin 2x}}$

8. $g(x) = (x-1)^5 \rightarrow g'(x) = \underline{\underline{5(x-1)^4}}$

9. $h'(x) = \frac{x \cdot \cos 2kx \cdot 2k - \sin 2x}{x^2} = \underline{\underline{\frac{2kx \cdot \cos 2kx - \sin 2kx}{x^2}}}$

10. $k'(x) = 2x\left(x^2 - 4\right)^2 + x^2 \cdot 2\left(x^2 - 4\right) \cdot 2x = 2x\left(x^2 - 4\right) \cdot \left(x^2 - 4 + 2x^2\right) = \underline{\underline{2x\left(x^2 - 4\right) \cdot \left(3x^2 - 4\right)}}$

11. $l'(x) = \frac{\left(x^2 + 3\right)^2 \cdot 18 - 18x \cdot 2\left(x^2 + 3\right) \cdot 2x}{\left(x^2 + 3\right)^4} = \frac{\left(x^2 + 3\right) \cdot 18 - 72x^2}{\left(x^2 + 3\right)^3} = \underline{\underline{\frac{54 - 54x^2}{\left(x^2 + 3\right)^3}}}$

12. $m'(x) = \cos 2x^2 \cdot \cos 2x^2 \cdot 4x + \left(-\sin 2x^2\right) \cdot 4x \cdot \sin 2x^2 = \underline{\underline{4x \cdot \left(\cos^2 2x^2 - \sin^2 2x^2\right)}}$

13. $f'(x) = 2(2ax + 2) \cdot 2a\cos x + (2ax + 2)^2(-\sin x) = \underline{\underline{(2ax + 2) \cdot [4a\cos x - (2ax + 2)\sin x]}}$

14. $g'(x) = 2 \cdot \left(\frac{1+x}{1-x}\right) \cdot \frac{(1-x) \cdot 1 - (1+x) \cdot (-1)}{(1-x)^2} = \frac{2(1+x)}{(1-x)} \cdot \frac{1 - x + 1 + x}{(1-x)^2} = \underline{\underline{\frac{4(1+x)}{(1-x)^3}}}$

15. $h'(x) = -\sin\left(x^2 - 4\right) \cdot 2x \cdot x^2 + \cos\left(x^2 - 4\right) \cdot 2x - \cos\left(x^2 - 4\right) \cdot 2x = \underline{\underline{-2x^3 \cdot \sin\left(x^2 - 4\right)}}$

16. $k'(x) = 10x\cos\frac{1}{5}x + 5x^2\left(-\sin\frac{1}{5}x\right)\frac{1}{5} = 10x\cos\frac{1}{5}x - x^2\sin\frac{1}{5}x = \underline{\underline{x\left(10\cos\frac{1}{5}x - x\sin\frac{1}{5}x\right)}}$

17. $l'(x) = \frac{2}{2\sqrt{2x}} \cdot x^2 + \sqrt{2x} \cdot 2x = \frac{\sqrt{2x}}{2x} \cdot x^2 + \sqrt{2x} \cdot 2x = \sqrt{2x}\,\frac{x}{2} + \sqrt{2x} \cdot 2x = \underline{\underline{2{,}5x\sqrt{2x}}}$