1) $\boldsymbol{f(x) = ln^3\sqrt{5x + \sqrt{x}}}$

$$f'(x) = 3.\ln^2\sqrt{5x + \sqrt{x}}.\left(\frac{\frac{1}{2}\left(5x + x^{\frac{1}{2}}\right)^{-\frac{1}{2}} \cdot (5 + \frac{1}{2}x^{-\frac{1}{2}})}{\sqrt{5x + \sqrt{x}}}\right)$$

Ou

$$f'(x) = 3.\ln^2\sqrt{5x + \sqrt{x}}.\left(\frac{\frac{1}{2}\left(5x + \sqrt{x}\right)^{-\frac{1}{2}} \cdot (5 + \frac{1}{2\sqrt{x}})}{\sqrt{5x + \sqrt{x}}}\right)$$

---

2) $f(x) = x.e^{\cos^2 x} + e^{\text{sen}(x^2)}$

$$f'(x) = e^{\cos x} - x.2.\cos(x).\text{sen}(x).e^{\cos^2 x} + 2x\cos(x^2)e^{\text{sen}\, x^2}$$

Ou

$$f'(x) = e^{\cos x} - 2x.e^{\cos x}.\cos(x), \text{sen}(x) + e^{\text{sen}\, x^2}.2x\cos(x^2)$$

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3) $\boldsymbol{y = \sqrt{\textbf{arc tg}\left(\frac{1}{1+x^2}\right)^2}}$

$$y` = -\frac{1}{2}.\left(\text{arc tg}\left(\frac{1}{1+x^2}\right)^2\right)^{-\frac{1}{2}}.\left(\frac{2.(1+x^2)^{-3}.(2x)}{1+\left(\frac{1}{1+x^2}\right)^4}\right)$$

ou $$y` = -\frac{1}{2}.\left(\text{arc tg}\left(\frac{1}{1+x^2}\right)^2\right)^{-\frac{1}{2}}.\left(\frac{2.\left(\frac{1}{1+x^2}\right).(1+x^2)^{-2}.(2x)}{1+(1+x^2)^{-4}}\right)$$

Ou $$y` = -\frac{1}{2\sqrt{\text{arc tg}\left(\frac{1}{1+x^2}\right)^2}}.\left(\frac{4x.(1+x^2)^{-3}}{1+\left(\frac{1}{1+x^2}\right)^4}\right)$$

4) $\boldsymbol{y = \sqrt{3+\sqrt{2+\sqrt{1+t}}}}$

$$y' = \frac{1}{2}.\left(3+\sqrt{2+\sqrt{1+t}}\,\right)^{-\frac{1}{2}}.\frac{1}{2}.\left(2+\sqrt{1+t}\right)^{-\frac{1}{2}}.\frac{1}{2}.(1+t)^{-\frac{1}{2}}$$

Ou

$$y' = \frac{1}{8}.\left(3+\sqrt{2+\sqrt{1+t}}\,\right)^{-\frac{1}{2}}.\left(2+\sqrt{1+t}\right)^{-\frac{1}{2}}.(1+t)^{-\frac{1}{2}}$$

Ou

$$y' = \frac{1}{2}.\left(3+\left(2+(1+t)^{\frac{1}{2}}\right)^{\frac{1}{2}}\right)^{-\frac{1}{2}}.\frac{1}{2}.\left(2+(1+t)^{\frac{1}{2}}\right)^{-\frac{1}{2}}.\frac{1}{2}.(1+t)^{-\frac{1}{2}}$$

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5) $\boldsymbol{f(\Delta) = \frac{arc\ sen\left(\frac{\Delta}{2}\right)}{\Delta+1}}$

$$f'(\Delta) = \frac{(\Delta+1)\ \dfrac{\frac{1}{2}}{\sqrt{1-\left(\frac{\Delta}{2}\right)^2}} - arc\ sen\ \left(\frac{\Delta}{2}\right)}{(\Delta+1)^2}$$

Ou

$$f'(\Delta) = \frac{\dfrac{(\Delta+1)}{2\sqrt{1-\left(\frac{\Delta}{2}\right)^2}} - arc\ sen\ \left(\frac{\Delta}{2}\right)}{(\Delta+1)^2}$$

6) $\boldsymbol{y = \frac{x.\ln x}{1+\ln x}}$

$$y' = \frac{\left(1.\ln x + x.\frac{1}{x}\right).(1+\ln x) - x.\ln x.\frac{1}{x}}{1+\ln x}$$

Ou

$y' = \frac{(\ln x+1).(1+\ln x)-\ln x}{1+\ln x}$ ou $y' = (\ln x+1) + \frac{\ln x}{1+\ln x}$

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7) $f(x)=\dfrac{\sqrt{x^3}.e^{(\cos x-2x)}}{\sec x}$

$$f'(x)=\frac{\left(\frac{3}{2}x^{\frac{1}{2}}.e^{(\cos x-2x)}+\sqrt{x^3}.e^{(\cos x-2x)}.(-\operatorname{sen}x-2)\right).\sec x-\sqrt{x^3}.e^{(\cos x-2x)}.\sec x.tgx}{\sec^2 x}$$

Ou

$$f'(x)=\frac{\left(\frac{3}{2}\sqrt{x}.e^{(\cos x-2x)}-\sqrt{x^3}.e^{(\cos x-2x)}.(\operatorname{sen}x+2)\right).\sec x-\sqrt{x^3}.e^{(\cos x-2x)}.\sec x.tgx}{\sec^2 x}$$

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8) $f(\infty)=\sqrt[3]{\sqrt{(\sqrt{\infty^3}+\infty^2)}+\infty}$

$$f'(\infty)=\frac{1}{3}.\left((\infty^{\frac{3}{2}}+\infty^2)^{\frac{1}{2}}+\infty\right)^{-\frac{2}{3}}.\left[\frac{1}{2}\left(\infty^{\frac{3}{2}}+\infty^2\right)^{-\frac{1}{2}}.\left(\frac{3}{2}\infty^{\frac{1}{2}}+2\infty\right)+1\right]$$

ou

$$f'(x)=\frac{1}{3}\left(\sqrt{(\sqrt{\infty^3}+\infty^2)}+\infty\right)^{-\frac{2}{3}}.\left[\frac{1}{2}\left(\sqrt{\infty^3}+\infty^2\right)^{-\frac{1}{2}}.\left(\frac{3}{2}\sqrt{\infty}+2\infty\right)+1\right]$$

9) $f(\Delta)=\sqrt[3]{5^{\arccos\left(e^{\Delta^2}\right)}}$

$$f'(\Delta)=-\frac{1}{3}\left(5^{\arccos\left(e^{\Delta^2}\right)}\right)^{-\frac{2}{3}}5^{\arccos\left(e^{\Delta^2}\right)}.\ln(5).\left(\frac{e^{\Delta^2}.2\Delta}{\sqrt{1-\left(e^{\Delta^2}\right)^2}}\right)$$

Ou

$$f'(\Delta)=-\frac{1}{3}\left(5^{\arccos\left(e^{\Delta^2}\right)}\right)^{-\frac{2}{3}}.5^{\arccos\left(e^{\Delta^2}\right)}.\ln(5).\frac{2\Delta.e^{\Delta^2}}{\sqrt{1-e^{2\Delta^2}}}$$

---

10) $$f(x)=\frac{\sqrt{x^3}-e^{\cos^2(x^2)}}{e^{2x}}$$

$$f'(x)=\frac{\left(\frac{3}{2}x^{\frac{1}{2}}+e^{\cos^2(x^2)}.2\cos(x^2).sen(x^2).(2x)\right).e^{2x}-\left(\sqrt{x^3}-e^{\cos^2(x^2)}\right).e^{2x}.2}{\left(e^{2x}\right)^2}$$

Ou

$$f'(x)=\frac{\left(\frac{3}{2}\sqrt{x}+4x.\cos(x^2).sen(x^2).e^{\cos^2(x^2)}\right).e^{2x}-\left(\sqrt{x^3}-e^{\cos^2(x^2)}\right).2e^{2x}}{e^{4x}}$$

11) $f(■)=\frac{\sqrt{2+\sec ■}}{\cos(\pi-\text{tg}\,■)}$

$$f'(■)=\frac{\frac{1}{2}.(2+\sec ■)^{-\frac{1}{2}}.\sec ■.\text{tg}\,■.\cos(\pi-\text{tg}\,■)-\sqrt{2+\sec ■}.\text{sen}(\pi-\text{tg}\,■).\sec^2 ■}{\cos^2(\pi-\text{tg}\,■)}$$

Ou

$$f'(■)=\frac{\frac{1}{2\sqrt{2+\sec ■}}.\sec ■.\text{tg}\,■.\cos(\pi-\text{tg}\,■)-\sqrt{2+\sec ■}.\text{sen}(\pi-\text{tg}\,■).\sec^2 ■}{(\cos(\pi-\text{tg}\,■))^2}$$

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12) $$f(x)=\frac{2^{\sqrt{x^3}}-e^{arctg\,(sen^2x)}}{e^{2x}}$$

$$f'(x)=\frac{\left(2^{\sqrt{x^3}}.(\ln 2).\frac{3}{2}x^{\frac{1}{2}}-\frac{2sen(x)\cos(x)}{1+\left(sen^2x\right)^2}\right)e^{2x}-\left(2^{\sqrt{x^3}}-e^{arctg(sen^2x)}\right).e^{2x}.2}{(e^{2x})^2}$$

Ou

$$f'(x)=\frac{\left(2^{\sqrt{x^3}}.(\ln 2).\frac{3}{2}\sqrt{x}-\frac{2sen(x)\cos(x)}{1+sen^4x}\right).e^{2x}-\left(2^{\sqrt{x^3}}-e^{arctg(sen^2x)}\right).2e^{2x}}{e^{4x}}$$