Derivujte a upravte

$$f(x)=\frac{x}{2}\cdot\sqrt{x^2-9}-\frac{9}{2}\cdot\ln\left(x+\sqrt{x^2-9}\right)$$

$$f'(x)=\frac{1}{2}\cdot\sqrt{x^2-9}+\frac{x}{2}\cdot\frac{1}{\cancel{2}\sqrt{x^2-9}}\cdot(\cancel{2}x)-\frac{9}{2}\cdot\frac{1}{x+\sqrt{x^2-9}}\cdot$$

$$\cdot\left(1+\frac{1}{\cancel{2}\sqrt{x^2-9}}\cdot\cancel{2}x\right)=$$ (toto je za 6 bodů u zkoušky) $=$

$$\frac{\sqrt{x^2-9}}{2}+\frac{x^2}{2\sqrt{x^2-9}}-\frac{9}{2(x+\sqrt{x^2-9})}\cdot\left(1+\frac{x}{\sqrt{x^2-9}}\right)=$$

$$=\frac{\sqrt{x^2-9}\cdot\sqrt{x^2-9}+x^2}{2\sqrt{x^2-9}}-\frac{9}{2(x+\sqrt{x^2-9})}-\frac{9x}{2\sqrt{x^2-9}\cdot(x+\sqrt{x^2-9})}=$$

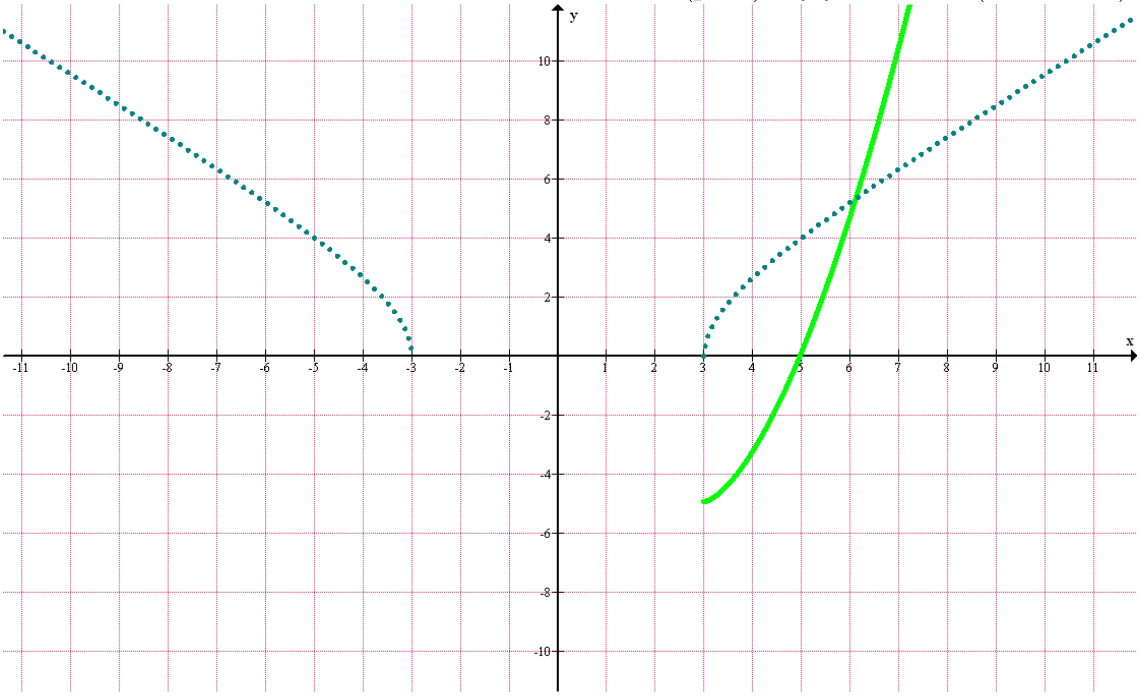
$$=\frac{x^2-9+x^2}{2\sqrt{x^2-9}}-\left(\frac{9}{2(x+\sqrt{x^2-9})}+\frac{9x}{2(x+\sqrt{x^2-9})\cdot\sqrt{x^2-9}}\right)=$$

$$=\frac{2x^2-9}{2\sqrt{x^2-9}}-\frac{9\sqrt{x^2-9}+9x}{2(x+\sqrt{x^2-9})\cdot\sqrt{x^2-9}}=\frac{2x^2-9}{2\sqrt{x^2-9}}-\frac{9\,\cancel{(x+\sqrt{x^2-9})}}{2\sqrt{x^2-9}\cdot\cancel{(x+\sqrt{x^2-9})}}=$$

$$=\frac{2x^2-9}{2\sqrt{x^2-9}}-\frac{9}{2\sqrt{x^2-9}}=\frac{2x^2-9-9}{2\sqrt{x^2-9}}=\frac{2x^2-18}{2\sqrt{x^2-9}}=\frac{\cancel{2}(x^2-9)}{\cancel{2}\sqrt{x^2-9}}=$$

$$=\frac{(x^2-9)^1}{(x^2-9)^{\frac{1}{2}}}=(x^2-9)^{1-\frac{1}{2}}=(x^2-9)^{\frac{1}{2}}=\underline{\underline{\sqrt{x^2-9}}}$$

Obrázek 1. Grafické znázornění zadané funkce (plná) a její derivace (tečkovaná)



Zdroj: program Graph