

Newton's integral

$$I = \int x \left(\sin x + \frac{\sin^4 x \cdot \cos x}{x} \right) dx$$

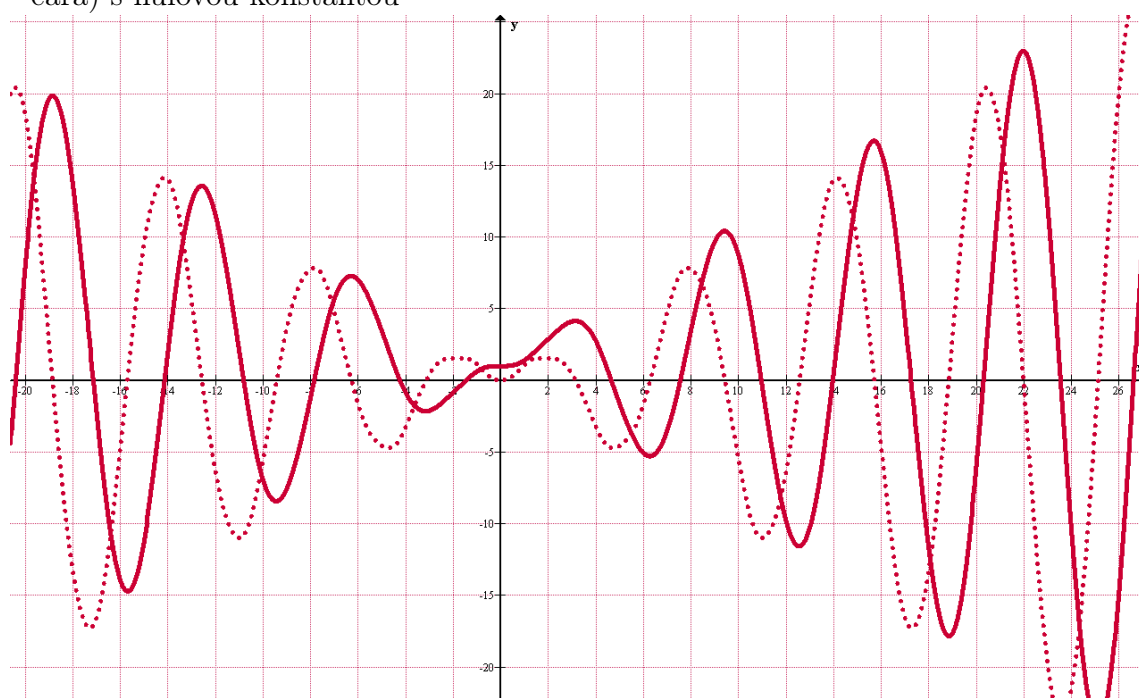
$$= \underbrace{\int x \sin x dx}_{I_1} + \underbrace{\int \sin^4 x \cdot \cos x dx}_{I_2}$$

$$I_1 = \left| \begin{array}{ll} u' = \sin x & u = x \\ v = -\cos x & v' = 1 \end{array} \right| = -x \cos x + \int \cos x dx = \underline{-x \cos x + \sin x + C}$$

$$I_2 = \left| \begin{array}{l} \sin x = t \\ \cos x dx = dt \end{array} \right| = \int t^4 dt = \frac{t^5}{5} + C \quad \text{Substitute back: } \frac{\sin^5 x}{5} + C$$

$$I = \underline{\sin x - x \cos x + \frac{\sin^5 x}{5} + C}$$

OBRÁZEK 1. Grafické znázornění funkce (tečkovaná) a jejího integrálu (plná čára) s nulovou konstantou



Zdroj: program Graph