2.51
א.ז

$$\frac{\operatorname{tg}^2(x)\left[1+\operatorname{ctg}(x)\right]-3}{\sin(x)-\cos(x)} = 3\operatorname{tg}(x)$$

תנאי ההגדרה:

$\operatorname{ctg} x$: $\boxed{x \neq \pi k}$

$\tg x \neq \ctg x$ ← $\boxed{x \neq \frac{\pi}{4} + 2\pi k}$

$$\operatorname{tg}^2 x\left(1+\frac{\operatorname{tg} x}{\sin x}\right) - 3 = 3\operatorname{tg} x \sin x - 3\operatorname{tg}^2 x \quad / \cdot \sin^2 x$$

$$\operatorname{ctg}^2 x(1+\operatorname{ctg} x) - \frac{3}{\sin^2 x} = 3\operatorname{ctg} x - 3\operatorname{ctg}^2 x$$

$$\operatorname{ctg}^2 x + \operatorname{ctg}^3 x - 3(1+\operatorname{ctg}^2 x) = 3\operatorname{ctg} x - 3\operatorname{ctg}^2 x$$

$$\operatorname{ctg}^3 x + \operatorname{ctg}^2 x - 3\operatorname{ctg} x - 3 = 0$$

$$\operatorname{ctg}^2 x(\operatorname{ctg} x + 1) - 3(\operatorname{ctg} x + 1) = 0$$

$$(\operatorname{ctg}^2 x - 3)(\operatorname{ctg} x + 1) = 0$$

$\operatorname{ctg} x = \sqrt{3} \longrightarrow$ $x = \frac{\pi}{6} + \pi k$

$\operatorname{ctg} x = -\sqrt{3} \longrightarrow$ $x = -\frac{\pi}{6} + \pi k$

$\operatorname{ctg} x = -1 \longrightarrow$ $x = -\frac{\pi}{4} + \pi k$