

$$\operatorname{tg}\left(\frac{1}{2} \cdot \operatorname{arctg} 3\right) = ? = \operatorname{tg}(x/2)$$

$$\operatorname{arctg} 3 = x, x \in (0; \pi) \Rightarrow x/2 \in (0; \pi/2)$$

$$\operatorname{ctg} x = 3$$

$$\operatorname{tg}(x/2) = a$$

$$\operatorname{ctg} x = 3$$

$$\operatorname{tg} x = \frac{1}{3}$$

$$\frac{1}{3} = \frac{2a}{1-a^2}$$

$$a^2 + 6a - 1 = 0$$

$$D/4 = 9 + 1 = 10$$

$$a_{1,2} = -3 \pm \sqrt{10} \text{ -- подходит только с плюсом}$$

$$a = -3 + \sqrt{10}$$

проверить равенство

$$\sin^2(\operatorname{arctg} 3 - \operatorname{arctg}(-\frac{1}{2})) = \frac{1}{2}$$

$$\sin^2(\operatorname{arctg} 3 - \operatorname{arctg}(-\frac{1}{2})) = ?$$

$$\operatorname{arctg} 3 = x, x \in (-\pi/2; \pi/2)$$

$$\operatorname{tg} x = 3$$

$$\operatorname{arctg}(-\frac{1}{2}) = y, y \in (0; \pi)$$

$$\operatorname{ctg} y = -\frac{1}{2}$$

$$\sin^2(x-y) = (\sin x \cos y - \sin y \cos x)^2$$

$$\sin y = a$$

$$\operatorname{ctg} y = -\frac{1}{2}$$

$$1 + \operatorname{ctg}^2 y = 1/\sin^2 y \Rightarrow \sin^2 y = 1/(1 + \operatorname{ctg}^2 y) = 1/(1 + \frac{1}{4}) = \frac{4}{5}$$

$$\sin x = t$$

$$\operatorname{tg} x = 3 \Rightarrow \operatorname{ctg} x = \frac{1}{3}$$

$$1 + \operatorname{ctg}^2 x = 1/\sin^2 x \Rightarrow \sin^2 x = 1/(1 + \operatorname{ctg}^2 x) = 1/(1 + 1/9) = 9/10$$

$$\sin^2(x-y) = (\sin x \cos y - \sin y \cos x)^2$$

$$= \sin^2 x \cdot \sin^2 y (\operatorname{ctg} y - \operatorname{ctg} x)^2 = \frac{4}{5} \cdot \frac{9}{10} \left(-\frac{1}{2} - \frac{1}{3}\right)^2$$

$$= \frac{36}{36} \cdot \frac{25}{50} = \frac{1}{2}$$

ВЕРНО