1. Let $tantanx = 2$. Which is $cotx$?

Solution.

Firstly, let solve the equation

$$tantanx = 2$$

for $tanx$.

As $2 > 0$, then we ought to use the following roots of the equation $tany = a$:

$$y = arctana + \pi n, \ \ n \in Z.$$

So, one can receive:

$$tanx = arctan2 + \pi n, \ \ n \in Z.$$

Now, we shall use the trigonometric identity

$$tany \cdot coty = 1,$$

which observes for all $y \neq \frac{\pi k}{2}, \ \ k \in Z$.

As $arctan2 + \pi n$ does not equal to $\frac{\pi k}{2}$ for any integer n and k, then

$$cotx = \frac{1}{tanx} = \frac{1}{arctan2 + \pi n}, \ \ n \in Z.$$

Answer: $cotx = \frac{1}{arctan2 + \pi n}, \ \ n \in Z.$