

$$\arctan \frac{1}{2} + \arctan \frac{1}{3} = \frac{\pi}{4}$$


The diagram illustrates the identity $\arctan \frac{1}{2} + \arctan \frac{1}{3} = \frac{\pi}{4}$ using a geometric construction. A large right triangle is formed by a horizontal base of length 2 and a vertical height of length 1. This triangle is divided into two regions: a blue region at the bottom and an orange region on top. The blue region is a right triangle with legs of length 2 and 1, and its angle at the bottom-left vertex is $\arctan \frac{1}{2}$. The orange region is a triangle with a horizontal base of length 1 and a vertical height of length 3, and its angle at the bottom-left vertex is $\arctan \frac{1}{3}$. The combined angle at the bottom-left vertex of the large triangle is the sum of these two angles, which is equal to $\frac{\pi}{4}$. The top-right angle of the large triangle is a right angle, $\frac{\pi}{2}$. The equation $\arctan \frac{1}{2} + \arctan \frac{1}{3} = \frac{\pi}{4}$ is written in the dark blue region.

1

3

1

2