

Exercise 71

Simplify the expression.

$$\sin(\tan^{-1} x)$$

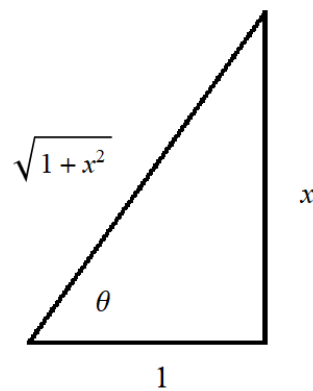
Solution

An inverse trigonometric function gives an angle. Let θ represent it.

$$\theta = \tan^{-1} x$$

$$\tan \theta = x = \frac{x}{1}$$

Draw the implied right triangle, using the Pythagorean theorem to determine the unknown length.



We can see that

$$\sin \theta = \frac{x}{\sqrt{1+x^2}}.$$

Therefore,

$$\sin(\tan^{-1} x) = \frac{x}{\sqrt{1+x^2}}.$$