

Consider the inverse sine,

$$f(x) = \sin^{-1} x = \arcsin x.$$

if

$$y = \sin^{-1} x,$$

then

$$x = \boxed{\phantom{000000}}.$$

Assume we would like to find  $y'$ , then we need to differentiate both sides such that

$$1 = \boxed{\phantom{000000}},$$

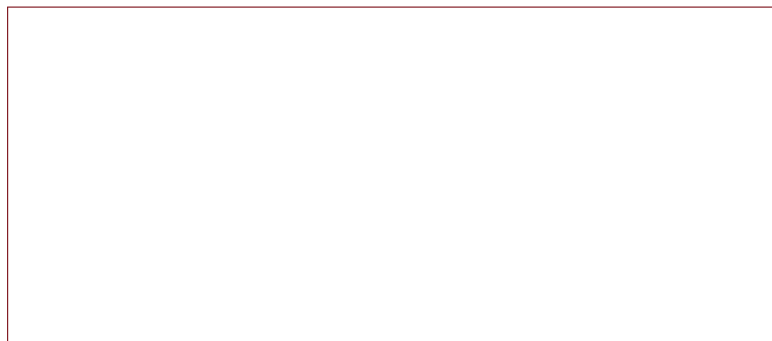
where we have used the chain rule to differentiate the right hand side.

Solving for  $y'$  gives,

$$y' = \boxed{\phantom{000000}},$$

To finish this we need to find  $\cos y$  in terms of  $x$ :

We know that  $\sin y = x$ , so that the corresponding right triangle is



From the triangle we find

$$\cos y = \boxed{\phantom{000000}},$$

so that

$$y' = \boxed{\phantom{000000}}.$$

**Exercise:**

Find the derivative of  $\tan^{-1} x$