

Keyx & y  
switch**Example:** Write the equation of the inverse function:

$$y = \cos(x) - 5 \quad X = \cos(y) - 5$$

$$x + 5 = \cos(y)$$

$$y = \cos^{-1}(x + 5)$$

**Example:** Write the equation of the inverse function:

$$y = \sin^{-1}(x + 2) \quad X = \sin^{-1}(y + 2)$$

$$\sin(x) = y + 2$$

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

Write the equation for the inverse of the following functions:

1.  $y = \sin(2x)$

$$X = \sin(2y) \quad \text{inverse of both sides}$$

$$\sin^{-1}(x) = 2y$$

$$y = \frac{1}{2} \sin^{-1}(x) \quad \text{or} \quad y = \frac{1}{2} \arcsin(x)$$

2.  $y = \arccos\left(\frac{1}{3}x\right)$

$$y = 3 \cos x$$

3.  $y = \tan\left(\frac{1}{2}\theta\right) + 1$

$$\theta = \tan\left(\frac{1}{2}y\right) + 1$$

$$\theta - 1 = \tan\left(\frac{1}{2}y\right)$$

$$\arctan(\theta - 1) = \frac{1}{2}y$$

$$y = 2 \arctan(\theta - 1)$$

or

$$y = 2 \tan^{-1}(\theta - 1)$$

4.  $y = \cos(x) + 3$

$$y = \arccos(x - 3)$$

or

$$y = \cos^{-1}(x - 3)$$

5.  $y = \arctan(\theta) - 2$

$$y = \tan(\theta + 2)$$

6.  $y = \cos^{-1}(x) + 4$

$$y = \cos(x - 4)$$

7.  $y = \sin(x + \pi)$

$$X = \sin(y + \pi)$$

$$\arcsin(x) = y + \pi$$

$$y = \arcsin(x) - \pi \quad \text{or}$$

$$y = \sin^{-1}(x) - \pi$$

8.  $y = \sin^{-1}(x + 3)$

$$y = \sin(x) - 3$$

Key**Example:** Write the equation of the inverse function:

$$y = \cos(x) - 5 \quad X = \cos(y) - 5$$

$$x - 5 = \cos(y) \quad \boxed{y = \cos^{-1}(x - 5)}$$

**Example:** Write the equation of the inverse function:

$$y = \sin^{-1}(x + 2) \quad X = \sin^{-1}(y + 2)$$

$$\sin(x) = y + 2 \quad \boxed{y = \sin(x) - 2}$$

Write the equation for the inverse of the following functions:

1.  $y = \sin(2x)$

$x = \sin(2y)$

$\sin^{-1}(x) = 2y$

$\boxed{y = \frac{1}{2} \sin^{-1}(x)} \text{ or } \boxed{y = \frac{1}{2} \arcsin(x)}$

2.  $y = \arccos\left(\frac{1}{3}x\right)$

$\boxed{y = 3 \cos x}$

3.  $y = \tan\left(\frac{1}{2}\theta\right) + 1$

$\theta = \tan\left(\frac{1}{2}y\right) + 1$

$\theta - 1 = \tan\left(\frac{1}{2}y\right)$

$\arctan(\theta - 1) = \frac{1}{2}y$

$\boxed{y = 2 \arctan(\theta - 1)}$   
or  
 $\boxed{y = 2 \tan^{-1}(\theta - 1)}$

4.  $y = \cos(x) + 3$

$y = \arccos(x - 3)$   
or

$y = \cos^{-1}(x - 3)$

5.  $y = \arctan(\theta) - 2$

$\boxed{y = \tan(\theta + 2)}$

6.  $y = \cos^{-1}(x) + 4$

$\boxed{y = \cos(x - 4)}$

7.  $y = \sin(x + \pi)$

$x = \sin(y + \pi)$

$\arcsin(x) = y + \pi$

$\boxed{y = \arcsin(x) - \pi \text{ or } = \sin^{-1}(x) - \pi}$

8.  $y = \sin^{-1}(x + 3)$

$\boxed{y = \sin(x) - 3}$