Inverse Composition of Trigonometric Expressions

Evaluate each inverse expression for principal values only and write your final answer as an exact value. If no solution exists put "DNE".

1. $\sin(\sin^{-1}\frac{3}{4})$

$\frac{3}{4}$

2. $\sin^{-1}(\sin\frac{\pi}{2})$

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

$\frac{\pi}{2}$

3. $\cos(\cos^{-1}\frac{2}{9})$

$\frac{2}{9}$

4. $\cos^{-1}(\cos\pi)$

$\cos^{-1}(-1)$

π

5. $\tan(\tan^{-1}\frac{\pi}{4})$

$\tan(1)$

$\frac{\pi}{4}$

6. $\tan^{-1}(\tan\frac{\pi}{3})$

$\frac{\pi}{3}$

7. $\cos(\tan^{-1}0)$

$\cos(0\pi)$

$\cos(0\pi)$

1

1

8. $\sin^{-1}(\cos\frac{\pi}{2})$

$\sin^{-1}(0)$

0

9. $\sin\left(\cos^{-1}\left(\frac{\sqrt{2}}{2}\right)\right)$ X

$\sin(\frac{\pi}{4})$

$\frac{\sqrt{2}}{2}$

10. $\arctan\left(\sin\frac{\pi}{2}\right)$

$\arctan(1)$

$\frac{\pi}{4}$

11. $\arcsin\left(\sin\frac{7\pi}{4}\right)$

$\arcsin(-\frac{\sqrt{2}}{2})$

$-\frac{\pi}{4}$

12. $\sin(2\cos^{-1}\frac{\sqrt{2}}{2})$ X

$\sin(2(\frac{\pi}{4}))$

$\sin(\frac{\pi}{2})$

1

13. $\sin(\tan^{-1}(1)-\sin^{-1}(1))$

$\sin(\frac{\pi}{4}-\frac{\pi}{2})$

$\sin(\frac{\pi}{4}-\frac{2\pi}{4})$

$\sin(-\frac{\pi}{4})$

$-\frac{\sqrt{2}}{2}$

14. $\cos(\tan^{-1}(1)-\sin^{-1}(1))$

$\cos(\frac{\pi}{4}-\frac{2\pi}{4})$

$\cos(-\frac{\pi}{4})$

$\frac{\sqrt{2}}{2}$

15. $\cos(\cos^{-1}(0)+\sin^{-1}\frac{1}{2})$

$\cos(\frac{\pi}{2}+\frac{\pi}{6})$

$\cos(\frac{3\pi}{6}+\frac{\pi}{6})$

$\cos(\frac{4\pi}{6})$

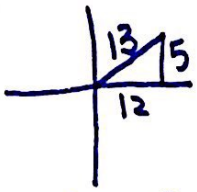
$\cos(\frac{2\pi}{3})$

$-\frac{1}{2}$

Inverse Composition of Trigonometric Expressions

Values Not on the Unit Circle: Draw a triangle $\cos=\frac{x}{r}$ $\sin=\frac{y}{r}$ $\tan=\frac{y}{x}$

16. $\sin\left(\arctan\frac{5}{12}\right)$ $\frac{y}{x}$



$\sin=\frac{y}{r}$

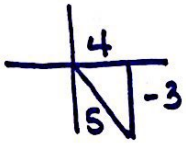
$5^2+12^2=r^2$

$\sqrt{169}=\sqrt{r^2}$

$13=r$

$\frac{5}{13}$

17. $\cos\left(\tan^{-1}\left(-\frac{3}{4}\right)\right)$ $\frac{y}{x}$



$\cos=\frac{x}{r}$

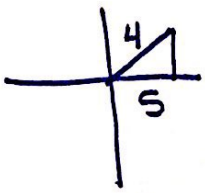
$4^2+(-3)^2=r^2$

$\sqrt{25}=\sqrt{r^2}$

$5=r$

$\frac{4}{5}$

18. $\tan\left(\arccos\frac{5}{4}\right)$ $\frac{x}{r}$ $\frac{5}{4}>1$



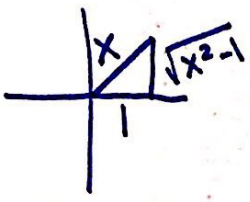
DNE

$5^2+y^2=4^2$

$25+y^2=16$

$y^2=-9$

19. $\sin\left(\arccos\left(\frac{1}{x}\right)\right)$ $\frac{x}{r}$



$1^2+y^2=x^2$

$1+y^2=x^2$

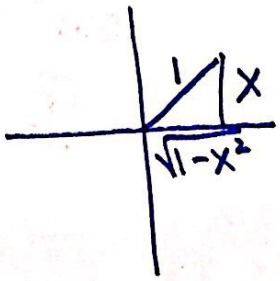
$\sqrt{y^2}=\sqrt{x^2-1}$

$\sin=\frac{y}{r}$

$y=\sqrt{x^2-1}$

$\frac{\sqrt{x^2-1}}{x}$

20. $\cos\left(\arcsin\frac{x}{1}\right)$ $\frac{y}{r}$



$\cos=\frac{x}{r}$

$\frac{\sqrt{1-x^2}}{1}=\sqrt{1-x^2}$

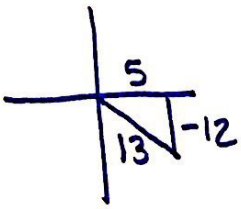
$x^2+a^2=1^2$

$x^2+a^2=1$

$\sqrt{a^2}=\sqrt{1-x^2}$

$a=\sqrt{1-x^2}$

17. $\cos\left(\sin^{-1}\left(\frac{-12}{13}\right)\right)$ $\frac{y}{r}$



$\cos=\frac{x}{r}$

$\frac{5}{13}$