

Practice With Inverse Trig Functions

Find the exact value of the expression whenever it is defined.

1. a. $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ b. $\cos^{-1}\left(-\frac{1}{2}\right)$ c. $\tan^{-1}(-\sqrt{3})$

2. a. $\sin^{-1}\left(-\frac{1}{2}\right)$ b. $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ c. $\tan^{-1}(-1)$

3. a. $\arcsin\frac{\sqrt{3}}{2}$ b. $\arccos\frac{\sqrt{2}}{2}$ c. $\arctan\frac{1}{\sqrt{3}}$

4. a. $\arcsin 0$ b. $\arccos(-1)$ c. $\arctan 0$

5. a. $\sin^{-1}\left(\frac{\pi}{3}\right)$ b. $\cos^{-1}\left(\frac{\pi}{2}\right)$ c. $\tan^{-1}(1)$

6. a. $\arcsin\left(\frac{\pi}{2}\right)$ b. $\arccos\left(\frac{\pi}{3}\right)$ c. $\arctan\left(-\frac{\sqrt{3}}{3}\right)$

7. a. $\sin\left[\arcsin\left(-\frac{3}{10}\right)\right]$ b. $\cos\left[\arccos\frac{1}{2}\right]$ c. $\tan(\arctan 14)$

8. a. $\sin\left(\sin^{-1}\frac{2}{3}\right)$ b. $\cos\left[\cos^{-1}\left(-\frac{1}{5}\right)\right]$ c. $\tan\left[\tan^{-1}(-9)\right]$

9. a. $\sin^{-1}\left(\sin\frac{\pi}{3}\right)$ b. $\cos^{-1}\left[\cos\left(\frac{5\pi}{6}\right)\right]$ c. $\tan^{-1}\left[\tan\left(-\frac{\pi}{6}\right)\right]$

10. a. $\arcsin\left[\sin\left(-\frac{\pi}{2}\right)\right]$ b. $\arccos(\cos 0)$ c. $\arctan\left(\tan\frac{\pi}{4}\right)$

11. a. $\arcsin\left(\sin\frac{5\pi}{4}\right)$ b. $\arccos\left(\cos\frac{5\pi}{4}\right)$ c. $\arctan\left(\tan\frac{7\pi}{4}\right)$

12. a. $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$ b. $\cos^{-1}\left(\cos\frac{4\pi}{3}\right)$ c. $\tan^{-1}\left(\tan\frac{7\pi}{6}\right)$

13. a. $\sin\left[\cos^{-1}\left(-\frac{1}{2}\right)\right]$ b. $\cos(\tan^{-1} 1)$ c. $\tan[\sin^{-1}(-1)]$

14. a. $\sin[\tan^{-1}\sqrt{3}]$ b. $\cos[\sin^{-1} 1]$ c. $\tan(\cos^{-1} 0)$

15. a. $\cot\left(\sin^{-1}\frac{2}{3}\right)$ b. $\sec\left[\tan^{-1}\left(-\frac{3}{5}\right)\right]$ c. $\csc\left[\cos^{-1}\left(-\frac{1}{4}\right)\right]$

16. a. $\cot\left[\sin^{-1}\left(-\frac{2}{5}\right)\right]$ b. $\sec\left[\tan^{-1}\left(\frac{7}{4}\right)\right]$ c. $\csc\left[\cos^{-1}\left(\frac{1}{5}\right)\right]$

18. a. $\sin\left[\sin^{-1}\frac{5}{13}-\cos^{-1}\left(-\frac{3}{5}\right)\right]$ b. $\cos\left[\sin^{-1}\frac{4}{5}+\tan^{-1}\frac{3}{4}\right]$

c. $\tan\left[\cos^{-1}\frac{1}{2}-\sin^{-1}\left(-\frac{1}{2}\right)\right]$

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19. a. $\sin\left[2\arcsin\left(-\frac{3}{5}\right)\right]$ b. $\cos\left(2\sin^{-1}\frac{15}{17}\right)$

c. $\tan\left(2\tan^{-1}\frac{3}{4}\right)$

20. a. $\sin\left(2\tan^{-1}\frac{5}{12}\right)$ b. $\cos\left(\arccos\frac{9}{41}\right)$

c. $\tan\left[2\arcsin\left(-\frac{8}{17}\right)\right]$

21. a. $\sin\left[\frac{1}{2}\sin^{-1}\left(-\frac{7}{25}\right)\right]$ b. $\cos\left[\frac{1}{2}\tan^{-1}\left(\frac{8}{15}\right)\right]$

c. $\tan\left(\frac{1}{2}\cos^{-1}\frac{3}{5}\right)$

22. a. $\sin\left[\frac{1}{2}\cos^{-1}\left(-\frac{3}{5}\right)\right]$ b. $\cos\left[\frac{1}{2}\sin^{-1}\left(-\frac{12}{13}\right)\right]$

c. $\tan\left[\frac{1}{2}\tan^{-1}\frac{40}{9}\right]$

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Find the exact value of the expression whenever it is defined.

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|-----|----|----------------------|----|----------------------|----|------------------|
| 1. | a. | $-\frac{\pi}{4}$ | b. | $\frac{2\pi}{3}$ | c. | $-\frac{\pi}{3}$ |
| 2. | a. | $-\frac{\pi}{6}$ | b. | $\frac{3\pi}{4}$ | c. | $-\frac{\pi}{4}$ |
| 3. | a. | $\frac{\pi}{3}$ | b. | $\frac{\pi}{4}$ | c. | $\frac{\pi}{6}$ |
| 4. | a. | 0 | b. | π | c. | 0 |
| 5. | a. | Undefined | b. | Undefined | c. | $\frac{\pi}{4}$ |
| 6. | a. | Undefined | b. | Undefined | c. | $-\frac{\pi}{6}$ |
| 7. | a. | $-\frac{3}{10}$ | b. | $\frac{1}{2}$ | c. | 14 |
| 8. | a. | $\frac{2}{3}$ | b. | $-\frac{1}{5}$ | c. | -9 |
| 9. | a. | $\frac{\pi}{3}$ | b. | $\frac{5\pi}{6}$ | c. | $-\frac{\pi}{6}$ |
| 10. | a. | $-\frac{\pi}{2}$ | b. | 0 | c. | $\frac{\pi}{4}$ |
| 11. | a. | $-\frac{\pi}{4}$ | b. | $\frac{3\pi}{4}$ | c. | $-\frac{\pi}{4}$ |
| 12. | a. | $\frac{\pi}{3}$ | b. | $\frac{2\pi}{3}$ | c. | $\frac{\pi}{6}$ |
| 13. | a. | $\frac{\sqrt{3}}{2}$ | b. | $\frac{\sqrt{2}}{2}$ | c. | undefined |
| 14. | a. | $\frac{\sqrt{3}}{2}$ | b. | 0 | c. | undefined |

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|-----|----|-------------------------|----|-------------------------|----|--|
| 15. | a. | $\frac{\sqrt{5}}{2}$ | b. | $\frac{\sqrt{34}}{5}$ | c. | $\frac{4\sqrt{15}}{15}$ |
| 16. | a. | $-\frac{\sqrt{21}}{2}$ | b. | $\frac{\sqrt{65}}{4}$ | c. | $\frac{5\sqrt{24}}{24} = \frac{5\sqrt{6}}{12}$ |
| 17. | a. | $\frac{3}{2}$ | b. | $\frac{1}{5}$ | c. | $\frac{77}{24}$ |
| 18. | a. | $-\frac{63}{65}$ | b. | 0 | c. | undefined |
| 19. | a. | $-\frac{24}{25}$ | b. | $-\frac{161}{289}$ | c. | $\frac{24}{7}$ |
| 20. | a. | $\frac{120}{169}$ | b. | $-\frac{1519}{1681}$ | c. | $-\frac{240}{161}$ |
| 21. | a. | $-\frac{1}{10}\sqrt{2}$ | b. | $\frac{4}{17}\sqrt{17}$ | c. | $\frac{1}{2}$ |
| 22. | a. | $\frac{2}{5}\sqrt{5}$ | b. | $\frac{3}{13}\sqrt{13}$ | c. | $\frac{4}{5}$ |