Find the exact value of the following expressions. If necessary, round to the nearest thousandths.
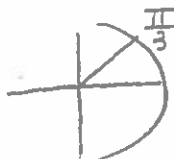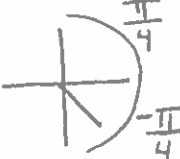
1. $\sin^{-1}\frac{1}{2}$

$\boxed{\dfrac{\pi}{6}}$

2. $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

$\boxed{-\dfrac{\pi}{3}}$

3. $\arccos\left(-\frac{1}{2}\right)$

$\boxed{\dfrac{2\pi}{3}}$

4. $\cos^{-1}\frac{\sqrt{2}}{2}$

$\boxed{\dfrac{\pi}{4}}$

5. $\arctan\sqrt{3}$

$\boxed{\dfrac{\pi}{3}}$

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

$\boxed{-\dfrac{\pi}{4}}$

7. $\sec^{-1}\frac{2\sqrt{3}}{3}$

$= \cos^{-1}\left(\frac{3}{2\sqrt{3}}\right)$

$= \cos^{-1}\left(\frac{3\sqrt{3}}{6}\right) = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = \boxed{\dfrac{\pi}{6}}$

8. $\csc^{-1}\left(-\frac{3}{2}\right)$

$\sin^{-1}\left(-\frac{2}{3}\right) = \boxed{-.730 \text{ radians}}$

(calculator) $\boxed{-41.810°}$

9. $\csc^{-1}\sqrt{2}$

$\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$

$= \sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = \boxed{\dfrac{\pi}{4}}$

10. $\sec^{-1}\left(-\frac{4}{3}\right)$

$\cos^{-1}\left(-\frac{3}{4}\right) = \boxed{2.419 \text{ radians}}$

(calculator) $\boxed{138.590°}$

11. $\cot^{-1}1$

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

$\boxed{\dfrac{\pi}{4}}$

12. $\cot^{-1}2$

$\tan^{-1}\left(\frac{1}{2}\right) = \boxed{.464 \text{ radians}}$

(calculator) $\boxed{26.565°}$

Find the exact value of each expression, if it is defined.

has a domain of -RN, not restricted, so... just make sure you can take the inverse of the ratio... for sin and cos $-1 \le x \le 1$

13. $\cos\left(\cos^{-1}\frac{1}{2}\right)$

$-1 \le \frac{1}{2} \le 1$ ✓

$\boxed{\dfrac{1}{2}}$

14. $\tan\left(\tan^{-1}\frac{7}{8}\right)$

$\boxed{\dfrac{7}{8}}$

15. $\sin(\sin^{-1}5)$

$-1 \le 5 \le 1$

$\boxed{\text{Not defined}}$

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

$-1 \le \frac{2}{3} \le 1$ ✓

$\boxed{\dfrac{2}{3}}$

17. $\tan(\tan^{-1}8)$

$\boxed{8}$

18. $\sin\left(\sin^{-1}\frac{5}{4}\right)$

$-1 \le \frac{5}{4} \le 1$

$\boxed{\text{Not defined}}$

has a restricted range

$-\frac{\pi}{2}$ to $\frac{\pi}{2}$

or 0 to π
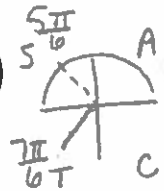
so you have to make sure your answers are in these quadrants.

Find the exact value of each expression, if it is defined.

19. $\tan^{-1}\left(\tan\frac{\pi}{6}\right)$

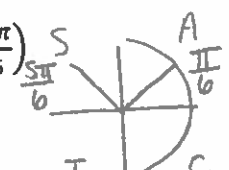$\boxed{\dfrac{\pi}{6}}$

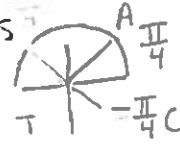20. $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$

$\boxed{\dfrac{5\pi}{6}}$

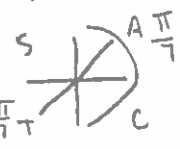21. $\sin^{-1}\left(\sin\frac{5\pi}{6}\right)$

$\boxed{\dfrac{\pi}{6}}$

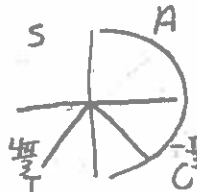22. $\cos^{-1}\left[\cos\left(-\frac{\pi}{4}\right)\right]$

$\boxed{\dfrac{\pi}{4}}$
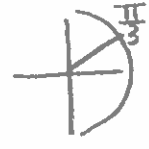
23. $\tan^{-1}\left(\tan\frac{8\pi}{7}\right)$

$\boxed{\dfrac{\pi}{7}}$
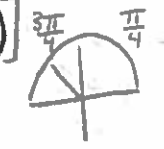
24. $\sin^{-1}\left(\sin\frac{4\pi}{3}\right)$

$\boxed{-\dfrac{\pi}{3}}$

Find the exact value of each expression, if it is defined.

25. $\cos\left(\sin^{-1}\frac{\sqrt{3}}{2}\right)$

$\cos\frac{\pi}{3}$

$\boxed{\dfrac{1}{2}}$

26. $\tan\left(\sin^{-1}\frac{\sqrt{2}}{2}\right)$

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

$\tan\frac{\pi}{4}$

$\boxed{-1}$

27. $\tan\left(\sin^{-1}\frac{1}{2}\right)$

$\tan\frac{\pi}{6}$
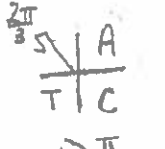
$\dfrac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}=\dfrac{1}{\sqrt{3}}=\boxed{\dfrac{\sqrt{3}}{3}}$
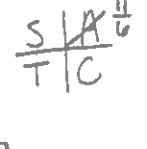
28. $\sin^{-1}\left(\cos\frac{2\pi}{3}\right)$

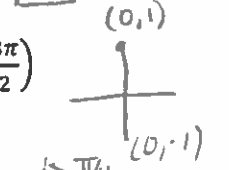$\sin^{-1}\left(-\frac{1}{2}\right)$

$\boxed{-\dfrac{\pi}{6}}$

29. $\cos^{-1}\left(\sqrt{3}\sin\frac{\pi}{6}\right)$

$\cos^{-1}\left(\sqrt{3}\left(\frac{1}{2}\right)\right)$

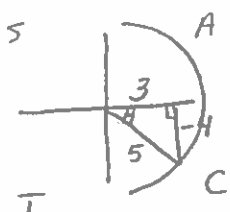$\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)=\boxed{\dfrac{\pi}{6}}$

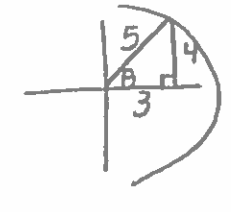30. $\tan^{-1}\left(\sin\frac{3\pi}{2}\right)$

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

$\boxed{-\dfrac{\pi}{4}}$

31. $\tan\left[\sin^{-1}\left(-\frac{4}{5}\right)\right]$

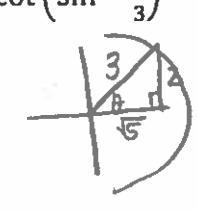$\boxed{\dfrac{-4}{3}}$

32. $\tan\left(\sin^{-1}\frac{4}{5}\right)$

$\boxed{\dfrac{4}{3}}$

33. $\csc\left(\cos^{-1}\frac{7}{25}\right)$

$\boxed{\dfrac{25}{24}}$

34. $\cot\left(\sin^{-1}\frac{2}{3}\right)$

$\boxed{\dfrac{\sqrt{5}}{2}}$