

SM3 6.4: Inverse Trig Functions

Problems:

Evaluate the inverse trig expressions without a calculator.

1) $\arcsin(0)$
 0

2) $\arccos(0)$
 $\frac{\pi}{2}$

3) $\arctan(0)$
 0

4) $\operatorname{arccot}(0)$
 $\frac{\pi}{2}$

5) $\arcsin(1)$
 $\frac{\pi}{2}$

6) $\arccos(1)$
 0

7) $\arctan(1)$
 $\frac{\pi}{4}$

8) $\operatorname{arccot}(1)$
 $\frac{\pi}{4}$

9) $\arcsin(-1)$
 $-\frac{\pi}{2}$

10) $\arccos(-1)$
 π

11) $\arctan(-1)$
 $-\frac{\pi}{4}$

12) $\operatorname{arccot}(-1)$
 $\frac{3\pi}{4}$

13) $\arcsin\left(\frac{\sqrt{2}}{2}\right)$
 $\frac{\pi}{4}$

14) $\arccos\left(\frac{\sqrt{2}}{2}\right)$
 $\frac{\pi}{4}$

15) $\arctan\left(\frac{\sqrt{3}}{3}\right)$
 $\frac{\pi}{6}$

16) $\operatorname{arccot}\left(\frac{\sqrt{3}}{3}\right)$
 $\frac{\pi}{3}$

17) $\arcsin\left(-\frac{\sqrt{2}}{2}\right)$
 $-\frac{\pi}{4}$

18) $\arccos\left(-\frac{\sqrt{2}}{2}\right)$
 $\frac{3\pi}{4}$

19) $\arctan\left(-\frac{\sqrt{3}}{3}\right)$
 $-\frac{\pi}{6}$

20) $\operatorname{arccsc}\left(-\frac{2\sqrt{3}}{3}\right)$
 $-\frac{\pi}{3}$

21) $\arcsin\left(-\frac{1}{2}\right)$
 $-\frac{\pi}{6}$

22) $\arccos\left(-\frac{\sqrt{3}}{2}\right)$
 $\frac{5\pi}{6}$

23) $\arctan(-\sqrt{3})$
 $-\frac{\pi}{3}$

24) $\operatorname{arcsec}(-2)$
 $\frac{2\pi}{3}$

Evaluate the expressions without a calculator.

25) $\arcsin\left(\sin\left(\frac{\pi}{3}\right)\right)$
 $\frac{\pi}{3}$

26) $\arccos\left(\cos\left(\frac{5\pi}{4}\right)\right)$
 $\frac{3\pi}{4}$

27) $\arctan\left(\tan\left(\frac{\pi}{6}\right)\right)$
 $\frac{\pi}{6}$

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

29) $\cos\left(\arccos\left(-\frac{1}{2}\right)\right)$
 $-\frac{1}{2}$

30) $\tan\left(\arctan\left(-\frac{1}{2}\right)\right)$
 $-\frac{1}{2}$

$$31) \arcsin\left(\sin\left(\frac{4\pi}{3}\right)\right)$$

$$-\frac{\pi}{3}$$

$$32) \arccos\left(\cos\left(\frac{3\pi}{2}\right)\right)$$

$$\frac{\pi}{2}$$

$$33) \arctan\left(\tan\left(\frac{5\pi}{6}\right)\right)$$

$$-\frac{\pi}{6}$$

$$34) \sin\left(\arccos\left(\frac{1}{2}\right)\right)$$

$$\frac{\sqrt{3}}{2}$$

$$35) \cos\left(\arcsin\left(\frac{\sqrt{2}}{2}\right)\right)$$

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

$$36) \tan\left(\operatorname{arccot}(\sqrt{3})\right)$$

$$\frac{\sqrt{3}}{3}$$

$$37) \arcsin\left(\cos\left(2 \arccos\left(\sin\left(\frac{\pi}{6}\right)\right)\right)\right)$$

$$-\frac{\pi}{6}$$

$$38) \arcsin\left(\frac{1}{2} \cot\left(\arccos\left(\frac{1}{2} \tan\left(\frac{\pi}{3}\right)\right)\right)\right)$$

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

$$39) \operatorname{arccot}(\sin(2 \arctan(\cos(\pi))))$$

$$\frac{3\pi}{4}$$

40) Why would it be a poor decision for the function $y = \arccos(x)$ to have a range of $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$?

On the range $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$, $\arccos(x)$ would not be able to accept negative values of x .