Name:_____

SM3 11.1: 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) $\arctan\left(-\sqrt{3}\right)$ $-\frac{\pi}{3}$

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

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

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

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

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.