[08-03-07-ATM] PT

EXERCISE 5.1

A *Find exact real number values without using a calculator.*

1. $\sin^{-1} 0$
2. $\cos^{-1} 0$
3. $\arccos(\sqrt{3}/2)$
4. $\arcsin(\sqrt{3}/2)$
5. $\tan^{-1} 1$
6. $\arctan \sqrt{3}$
7. $\cos^{-1} \frac{1}{2}$
8. $\sin^{-1}(\sqrt{2}/2)$

In Problems 9–14, evaluate to four significant digits using a calculator.

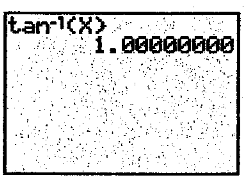
RAD

9. $\cos^{-1} 0.4038$
10. $\sin^{-1} 0.9103$
11. $\tan^{-1} 43.09$
12. $\arctan 103.7$
13. $\arcsin 1.131$
14. $\arccos 3.051$

yes

15. Explain how to find the value of x that produces the result shown in the graphing utility window below, and find it. The utility is in degree mode. Give the answer to six decimal places.

16. Explain how to find the value of x that produces the result shown in the graphing utility window below, and find it. The utility is in radian mode. Give the answer to six decimal places.



B *Find exact real number values without using a calculator.*

17. $\arccos(-\frac{1}{2})$
18. $\arcsin(-\sqrt{2}/2)$
19. $\tan^{-1}(-1)$
20. $\arctan(-\sqrt{3})$
21. $\sin^{-1}(-\sqrt{3}/2)$
22. $\cos^{-1}(-1)$
23. $\cos^{-1}(-\sqrt{3}/2)$
24. $\sin^{-1}(-1)$
25. $\sin[\sin^{-1}(-0.6)]$
26. $\tan(\tan^{-1} 25)$
27. $\cos[\sin^{-1}(-\sqrt{2}/2)]$
28. $\sec[\sin^{-1}(-\sqrt{3}/2)]$

yes

Evaluate to four significant digits using a calculator.

29. $\tan^{-1}(-4.038)$
30. $\arctan(-10.04)$
31. $\sec[\sin^{-1}(-0.0399)]$
32. $\cot[\cos^{-1}(-0.7003)]$
33. $\sqrt{2} + \tan^{-1} \sqrt[3]{5}$
34. $\sqrt{5} + \cos^{-1}(1 - \sqrt{2})$

yes

Graph Problems 35 and 36 with the aid of a calculator. Plot points using x values −1.0, −0.8, −0.6, −0.4, −0.2, 0.0, 0.2, 0.4, 0.6, 0.8, and 1.0; then join the points with a smooth curve.

35. $y = \sin^{-1} x$
36. $y = \cos^{-1} x$

Find the exact degree measure of θ without a calculator.

37. $\theta = \arccos(-1/2)$
38. $\theta = \arcsin(-\sqrt{2}/2)$
39. $\theta = \tan^{-1}(-1)$
40. $\theta = \arctan(-\sqrt{3})$
41. $\theta = \sin^{-1}(-\sqrt{3}/2)$
42. $\theta = \cos^{-1}(-1)$

yes

In Problems 43–48, find the degree measure of θ to two decimal places using a calculator.

43. $\theta = \tan^{-1} 3.0413$
44. $\theta = \cos^{-1} 0.7149$
45. $\theta = \arcsin(-0.8107)$
46. $\theta = \arccos(-0.7728)$
47. $\theta = \arctan(-17.305)$
48. $\theta = \tan^{-1}(-0.3031)$

yes

49. Evaluate $\cos^{-1}[\cos(-0.3)]$ with a calculator set in radian mode. Explain why this does or does not illustrate a cosine–inverse cosine identity.
50. Evaluate $\sin^{-1}[\sin(-2)]$ with a calculator set in radian mode. Explain why this does or does not illustrate a sine–inverse sine identity.
51. The identity $\sin(\sin^{-1} x) = x$ is valid for $-1 \le x \le 1$.
    (A) Graph $y = \sin(\sin^{-1} x)$ for $-1 \le x \le 1$.
    (B) What happens if you graph $y = \sin(\sin^{-1} x)$ over a wider interval, say $-2 \le x \le 2$? Explain.
52. The identity $\cos(\cos^{-1} x) = x$ is valid for $-1 \le x \le 1$.
    (A) Graph $y = \cos(\cos^{-1} x)$ for $-1 \le x \le 1$.
    (B) What happens if you graph $y = \cos(\cos^{-1} x)$ over a wider interval, say $-2 \le x \le 2$? Explain.

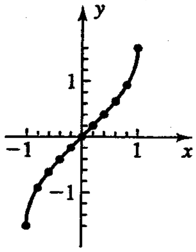
C *In Problems 53–56, find exact real number values without using a calculator.*

53. $\sin[\arccos \frac{1}{2} + \arcsin(-1)]$
54. $\cos[\cos^{-1}(-\sqrt{3}/2) - \sin^{-1}(-\frac{1}{2})]$

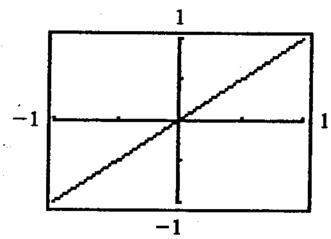
CHAPTER 5

Exercise 5.1

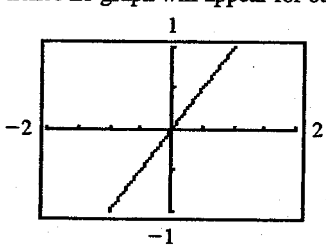
1. 0 **3.** $\pi/6$ **5.** $\pi/4$ **7.** $\pi/3$ **9.** 1.155
11. 1.548 **13.** Not defined
15. $x = \sin 37 = 0.601815$ **17.** $2\pi/3$ **19.** $-\pi/4$
21. $-\pi/3$ **23.** $5\pi/6$ **25.** -0.6 **27.** $\sqrt{2}/2$
29. -1.328 **31.** 1.001 **33.** 2.456
35.



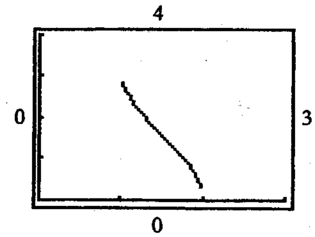
37. 120° **39.** −45° **41.** −60° **43.** 71.80°
45. −54.16° **47.** −86.69°
49. 0.3; does not illustrate a cosine–inverse cosine identity, because $\cos^{-1}(\cos x) = x$ only if $0 \le x \le \pi$.
51. (A)



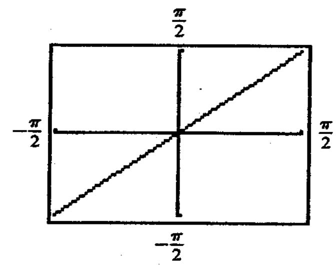
(B) The domain of $\sin^{-1}$ is restricted to $-1 \le x \le 1$; hence no graph will appear for other values of x.



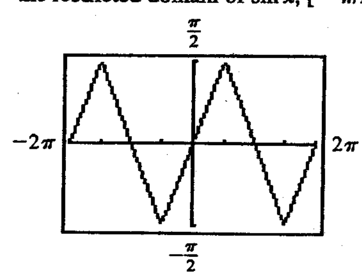
53. $-\frac{1}{2}$ **55.** $-\frac{24}{25}$ **57.** $\sqrt{1-x^2}$ **59.** $\dfrac{x}{\sqrt{1-x^2}}$
63. (A) $\cos^{-1} x$ has domain $-1 \le x \le 1$; therefore, $\cos^{-1}(2x-3)$ has domain $-1 \le 2x - 3 \le 1$, or $1 \le x \le 2$.
(B) The graph appears only for the domain values $1 \le x \le 2$.



65. (A) $h^{-1}(x) = 1 + \sin^{-1}[(x-3)/5]$
(B) $\sin^{-1} x$ has domain $-1 \le x \le 1$; therefore, $1 + \sin^{-1}[(x-3)/5]$ has domain $-1 \le (x-3)/5 \le 1$, or $-2 \le x \le 8$.
67. (A)



(B) The domain for $\sin x$ is $(-\infty, \infty)$ and the range is $[-1, 1]$, which is the domain for $\sin^{-1} x$. Thus, $y = \sin^{-1}(\sin x)$ has a graph over the interval $(-\infty, \infty)$, but $\sin^{-1}(\sin x) = x$ has a graph only on the restricted domain of $\sin x$, $[-\pi/2, \pi/2]$.



69. (A) $\theta = 2\sin^{-1}(1/M)$, $M > 1$ (B) 72°; 52°
71. (A) It appears that θ increases, and then decreases.