5.7.6. EXERCISES

Find the exact value of each expression

1. $\arcsin\frac{1}{2}$;
2. $\arcsin\frac{\sqrt{2}}{2}$;
3. $\arcsin\left(-\frac{1}{2}\right)$;
4. $\arccos\left(-\frac{\sqrt{2}}{2}\right)$;
5. $\arccos\left(-\frac{\sqrt{3}}{2}\right)$;
6. $\arctan\left(-\frac{\sqrt{2}}{2}\right)$;
7. $\arctan(-1)$;
8. $\arctan\sqrt{3}$;
9. $\arcsin 0$;
10. $\arcsin 1$.

Use a calculator to find the value of eachexpression rounded to two decimal places

1. $\arcsin(-20)$;
2. $\arcsin 0.3$;
3. $\arccos\frac{1}{8}$;
4. $\arcsin 0.47$;
5. $\arctan(-20)$;
6. $\arctan 30$;
7. $\arccos\frac{\sqrt{5}}{7}$;
8. $\arccos\frac{4}{9}$;
9. $\arctan(-\sqrt{5061})$;
10. $\arcsin(-0.625)$.

Find the exact value of each expression, if possible. Do not use a calculator

1. $\sin(\arcsin 0.9)$;
2. $\arcsin\left(\sin\frac{\pi}{3}\right)$;
3. $\arcsin\left(\sin\frac{5\pi}{6}\right)$;
4. $\tan(\arctan 125)$;
5. $\arctan\left(\tan\left[-\frac{\pi}{6}\right]\right)$;
6. $\arcsin(\sin\pi)$;
7. $\sin(\arcsin\pi)$;
8. $\cos(\arccos 0.57)$;
9. $\arccos\left(\cos\frac{4\pi}{3}\right)$;
10. $\arccos(\cos 2\pi)$;
11. $\arctan\left(\tan\left[-\frac{\pi}{3}\right]\right)$;
12. $\arctan\left(\tan\frac{3\pi}{4}\right)$.

Use a sketch to find the exact value of each expression

1. $\cos\left(\arcsin\frac{1}{2}\right)$;
2. $\tan\left(\arccos\frac{5}{13}\right)$;
3. $\tan\left(\arcsin\left[-\frac{3}{5}\right]\right)$;
4. $\sin\left(\arctan\frac{7}{24}\right)$;
5. $\cot\left(\arcsin\left(-\frac{4}{5}\right)\right)$;
6. $\cos\left(\arcsin\frac{5}{13}\right)$;
7. $\sin\left(\arccos\frac{\sqrt{2}}{2}\right)$;
8. $\sin\left(\arctan\left[-\frac{3}{4}\right]\right)$.

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Use a right triangle to write each expression as an algebraic expression. Assume that x is positive and that the given inverse trigonometric function is defined for the expression in x

1. $\tan(\arccos x)$;
2. $\cos(\arcsin 2x)$;
3. $\cos\left(\arcsin \frac{1}{x}\right)$;
4. $\cot\left(\arctan \frac{x}{\sqrt{3}}\right)$;
5. $\sin(\arctan x)$;
6. $\sin(\arccos 2x)$;
7. $\cot\left(\arctan \frac{x}{\sqrt{2}}\right)$;
8. $\cot\left(\arcsin \frac{\sqrt{x^2-9}}{x}\right)$.

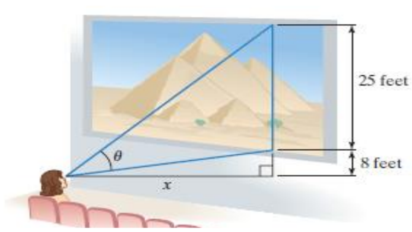
Use transformations (vertical shifts, horizontal shifts, reflections, stretching, or shrinking) of these graphs to graph each function. Then use interval notation to give the function's domain and range

1. $f(x) = \arcsin x + \frac{\pi}{2}$;
2. $f(x) = \arccos(x+1)$;
3. $g(x) = -2\arctan x$;
4. $f(x) = \arcsin(x-2) - \frac{\pi}{2}$;
5. $f(x) = \arccos x + \frac{\pi}{2}$;
6. $h(x) = -3\arctan x$;
7. $f(x) = \arccos(x-2) - \frac{\pi}{2}$;
8. $f(x) = \arcsin \frac{x}{2}$.

Determine the domain and the range of each function

1. $f(x) = \sin(\arcsin x)$;
2. $f(x) = \cos(\arccos x)$;
3. $f(x) = \arcsin(\cos x)$;
4. $f(x) = \arcsin(\sin x)$;
5. $f(x) = \cos(\arccos x)$;
6. $f(x) = \arccos(\sin x)$.

5.7.7. APPLICATION EXERCISES



1. Your neighborhood movie theater has a 25-foot-high screen located 8 feet above your eye level. If you sit too close to the screen, your viewing angle is too small, resulting in a distorted picture. By contrast, if you sit too far back, the image is quite small, diminishing the movie's visual impact. If you sit feet back from the screen, your viewing angle θ, is given by

$$\theta = \arctan\frac{33}{x} - \arctan\frac{8}{x}.$$

Find the viewing angle in radians, at distance of 5 feet, 10 feet, 15 feet, 20 feet and 25 feet.

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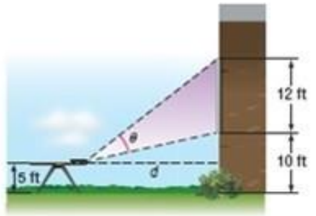
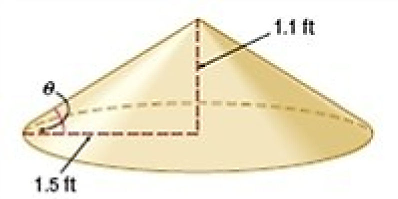


2. SPORTS. Steve and Ravi want to project a prosoccer game on the side of their apartment building. They have placed a projector on a table that stands 5 feet above the ground and have hung a 12-foot-tall screen 10 feet above the ground.
a. Write a function expressing θ in terms of distance d.
b. Use a graphing calculator to determine the distance for the maximum projecting angle.



3. SAND. When piling sand, the angle formed between the pile and the ground remains fairly consistent and is called the angle of repose. Suppose Jade creates a pile of sand at the beach that is 3 feet in diameter and 1.1 feet high.
a. What is the angle of repose?
b. If the angle of repose remains constant, how many feet in diameter would a pile need to be to reach a height of 4 feet?

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