1. Simplify the expression so it is free of any trig or inverse trig function. Use exact value.

a. $\sin^{-1}(0)$

ans: 0

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

ans: $\frac{\pi}{3}$

c. $\cos^{-1}(-1)$

ans: $\pi$

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

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

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

ans: $-\frac{\pi}{4}$

f. $\arcsin\left(\frac{1}{2}\right)$

ans: $\frac{\pi}{6}$

g. $\arccos\left(-\frac{\sqrt{2}}{2}\right)$

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

2. Simplify the expression so it is free of any trig or inverse trig function. Use exact value.

a. $\arcsin(\sin(3\pi))$

ans: 0

b. $\arccos(\cos(-\frac{9\pi}{2}))$

ans: $\frac{\pi}{2}$

c. $\tan^{-1}(\tan(\frac{-21\pi}{4}))$

ans: $-\frac{\pi}{4}$

d. $\sin^{-1}(\sin(4.579))$

ans: $-(4.579-\pi)=\pi-4.579$

e. $\cos^{-1}(\cos(-13))$

ans: $13-4\pi$

f. $\tan^{-1}(\tan(-10))$

ans: $3\pi-10$

g. $\sin^{-1}(\sin(-11.5))$

ans: $4\pi-11.5$

h. $\sin^{-1}(\sin(-8))$

ans: $8-3\pi$

i. $\cos^{-1}(\cos(14))$

ans: $14-4\pi$

3. Simplify the expression so it is free of any trig or inverse trig function. Use exact value.

a. $\sin(\arccos(\frac{1}{3}))$

ans: $\frac{\sqrt{8}}{3} = \frac{2\sqrt{2}}{3}$

b. $\cos(\arcsin(-\frac{2}{5}))$

ans: $\frac{\sqrt{21}}{5}$

c. $\sec(\tan^{-1}(3))$

ans: $\sqrt{10}$

d. $\tan(\cos^{-1}(\frac{2}{7}))$

ans: $\frac{\sqrt{45}}{2} = \frac{3\sqrt{5}}{2}$

e. $\csc(\sin^{-1}(\frac{3}{\sqrt{13}}))$

ans: $\frac{\sqrt{13}}{3}$

4. Rewrite the following in terms of $x$ so that the expression is free of any trig or inverse trig function:

a. $\sin(\arccos x)$

ans: $\sqrt{1-x^2}$

b. $\cos(\tan^{-1} x)$

ans: $\frac{1}{\sqrt{1+x^2}}$

c. $\tan(\sin^{-1} x)$

ans: $\frac{x}{\sqrt{1-x^2}}$

5. Solve the given equation. If the range for $x$ is indicated, only solve for $x$ over that interval. Otherwise, solve for all possible solutions.

a. $\cos x = \dfrac{\sqrt{2}}{2}$

Ans: $x = \pm\dfrac{\pi}{4} + 2\pi n$

b. $\sin x = -\dfrac{\sqrt{3}}{2}$

Ans: $x = \dfrac{4\pi}{3} + 2\pi n$ or $\dfrac{5\pi}{3} + 2\pi n$

c. $\sin x = -\dfrac{1}{2}$

Ans: $x = \dfrac{7\pi}{6} + 2\pi n$ or $\dfrac{11\pi}{6} + 2\pi n$

d. $\tan x = \sqrt{3}$

Ans: $x = \dfrac{\pi}{3} + \pi n$

e. $\cos x = -1$

Ans: $x = \pi + 2\pi n$

f. $\sin x = 0$

Ans: $x = \pi n$

g. $2\sin x + 1 = 0$, $0 \le x \le 2\pi$

Ans: $x = \dfrac{7\pi}{6}$ or $x = \dfrac{11\pi}{6}$

h. $2\cos x - \sqrt{3} = 0$, $0 \le x \le 2\pi$

Ans: $x = \dfrac{\pi}{6}$ or $x = \dfrac{11\pi}{6}$

i. $\cos x = \cot x$, $0 \le x \le 2\pi$

Ans: $x = \dfrac{\pi}{2}$ or $x = \dfrac{3\pi}{2}$

j. $\tan x = -2\sin x$, $0 \le x \le 2\pi$

Ans: $x = 0$ or $x = \dfrac{2\pi}{3}$

or $x = \pi$ or $x = \dfrac{4\pi}{3}$

or $x = 2\pi$

k. $2\cos^2 x + 3\sin x = 0$, $0 \le x \le 2\pi$

Ans: $x = \dfrac{7\pi}{6}$ or $x = \dfrac{11\pi}{6}$

l. $\cos 2x = \sin x$

Ans: $x = \dfrac{\pi}{6} + 2\pi n$ or $x = \dfrac{5\pi}{6} + 2\pi n$ or $x = \dfrac{3\pi}{2} + 2\pi n$

m. $\sin 2x = 1 + \cos 2x$

Ans: $x = \dfrac{\pi}{2} + \pi n$

n. $\cos 2x = \cos x - 1$

Ans: $x = \pm\dfrac{\pi}{3} + 2\pi n$ or $x = \dfrac{\pi}{2} + \pi n$