

TRIG PRACTICE - 3

1. Express in terms of $\sin x$ and $\cos x$.

a) $\sin(x - \pi/6)$

b) $\cos(x + \frac{3}{4}\pi)$

c) $\sin(0.91 - x)$

d) $\cos(x - 2.07)$

e) $\sin(x + 2.07)$

f) $\cos(3x)$ $[3x = 2x + x]$

g) $\sin(4x)$

Example. $\cos(x + 2.82)$

$$\begin{aligned} &= \cos x \cos 2.82 - \sin x \sin 2.82 \\ &= \cos x (-\cos 0.32) - \sin x \sin 0.32 \\ &\text{table} = -.95 \cos x - .31 \sin x \end{aligned}$$

Ans. c) $.79 \cos x - .61 \sin x$

d) $-.48 \cos x + .88 \sin x$

2. In each case, write the function $p \sin x + q \cos x$ in the form $A \sin(x+b)$.

a) $\sin x + \cos x$

$[A^2 = p^2 + q^2; (\cos b, \sin b) = (p/A, q/A)]$

b) $-\sin x + \cos x$

c) $-\sin x - \sqrt{3} \cos x$

d) $-\sqrt{3} \sin x + \cos x$

Ans. b) $b = 3\pi/4$; c) $b = 4\pi/3$

3. Given that x satisfies the stated conditions, find $\sin 2x$, $\cos 2x$, $\sin \frac{1}{2}x$, $\cos \frac{1}{2}x$. Sketch x , $2x$ and $\frac{1}{2}x$ on the unit circle.

a) $\sin x = -3/5$; $\pi < x < 3\pi/2$

b) $\cos x = 12/13$; $-\pi/2 < x < 0$

c) $\sin x = 12/13$; $\pi/2 < x < \pi$

d) $\cos x = -3/5$; $-\pi < x < -\pi/2$

Ans. a) $\cos \frac{1}{2}x = -\sqrt{0.10}$

c) $\sin \frac{1}{2}x = +3/\sqrt{13}$

4. Simplify the expression, so that no trig functions or their inverses appear.

a) $\sin(\text{Arc cos } x)$

b) $\cos(\text{Arc sec } \frac{1}{2}x)$

c) $\sin(2 \text{Arc sin } x)$ [double angle]

d) $\cos(2 \text{Arc sin } \frac{x}{3})$

Ans. b) $2/x$

d) $1 - 2x^2/9$

5. Find all solutions x , for $0 \leq x < 2\pi$.

a) $2 \sin x = -1$

b) $2 \cos^2 x = 1$

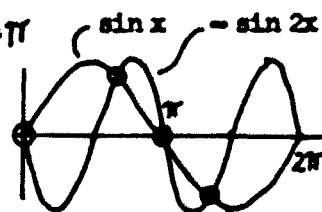
c) $\cos x = \cos 2x$

d) $\sin x = -\sin 2x$

e) $\sin x = \cos 2x$

Ans. b) $x = \frac{1}{4}\pi, \frac{3}{4}\pi, \frac{5}{4}\pi, \frac{7}{4}\pi$

d) $x = 0, \frac{2}{3}\pi, \pi, \frac{4}{3}\pi$



6. Graph $y = \text{Arc sin } x$ and $y = \text{Arc cos } x$. On each graph plot the points where

a) $x = -1$

b) $x = \sqrt{3}/2$

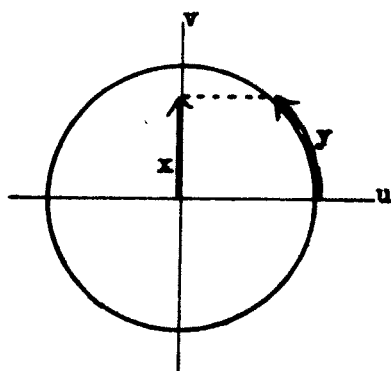
c) $x = -1/2$

d) $x = 0.79$

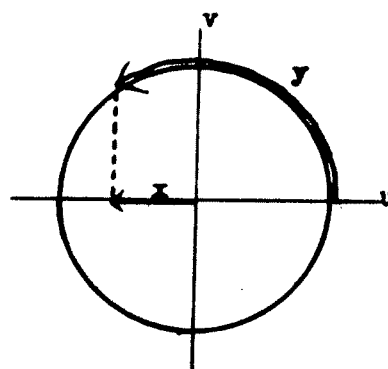
e) $x = -0.62$

Ans. d) $\text{Arc sin } 0.79 = 0.91 \text{ rad}$

e) $\text{Arc cos } -0.62 = 2.24 \text{ rad}$



$(u^2 + v^2 = 1)$



$y = \text{Arc sin } x$

= the arc between $-\frac{1}{2}\pi$ and $\frac{1}{2}\pi$
whose sine is x .

$\text{Arc sin } (-x) = -\text{Arc sin } x$

$y = \text{Arc cos } x$

= the arc between 0 and π
whose cosine is x .

$\text{Arc cos } (-x) = \pi - \text{Arc cos } x$

In each case, $-1 \leq x \leq 1$; and y is measured in radians.