

SOLVING TRIGONOMETRIC EQUATIONS USING THE AUXILIARY ANGLE METHOD

1 Express each of the following in the form $r \sin(x + \alpha)$.

(a) $\sin x + \cos x$

(c) $5 \sin x + 12 \cos x, 0^\circ < \alpha < 90^\circ$

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2 Express each of the following in the form $r \sin(x - \alpha)$.

(a) $\sin x - \sqrt{3} \cos x$

(c) $2 \sin x - \cos x, 0^\circ < \alpha < 90^\circ$

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3 Express each of the following in the form $r \cos(x - \alpha)$.

(a) $\cos x + \sin x$

(d) $3 \cos x + 2 \sin x, 0^\circ < \alpha < 90^\circ$

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5 Which expression is equivalent to $8 \sin x - 15 \cos x$?

A $17 \cos(x - 61^\circ 56')$

B $17 \sin(x - 61^\circ 56')$

C $17 \cos(x + 61^\circ 56')$

D $17 \sin(x + 61^\circ 56')$

6 Find (i) the maximum and (ii) the minimum value of the following expressions. Also find the smallest positive values of x for which the maximum and minimum occur.

(a) $\sin x - \sqrt{3} \cos x$

(c) $2\sqrt{3} \cos x - 2 \sin x$

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7 Solve:

(a) $\cos x + \sin x = 1, 0 \leq x \leq 2\pi$

(h) $\cos x - \sin x = -1, -\frac{\pi}{2} \leq x \leq \frac{3\pi}{2}$

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- 8 Sketch the graph of $f(x) = \sqrt{3}\cos x - \sin x$, $0 \leq x \leq 2\pi$. Use your sketch to find the values of x for which:
- (a) $f(x) = 1$ (b) $f(x) > 1$