7.2: (Addition and Subtraction Formulas)

If the function $y = -3\sin 2x - 3\cos 2x$ is written in the form $y = k\sin(2x + \beta),\ 0 < \beta < 2\pi,$ then the values of k and β are (a) $k = 3\sqrt{2}, \beta = \frac{5\pi}{4}$ (b) $k = -6, \beta = \frac{5\pi}{4}$ (c) $k = 3\sqrt{2}, \beta = \frac{5\pi}{8}$ (d) $k = -6, \beta = \frac{3\pi}{4}$ (e) $k = 3\sqrt{2}, \beta = \frac{7\pi}{4}$	Sum of Sine and Cosine Identities.
The range of $y = \frac{\pi}{\csc x} - \frac{\pi}{\sec x}$ is: A) $[-\pi\sqrt{2}, \pi\sqrt{2}]$ B) $[-\sqrt{2}, \sqrt{2}]$ C) $[-\pi, \pi]$ D) $\left[-\frac{\sqrt{2}}{\pi}, \frac{\sqrt{2}}{\pi}\right]$ E) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$	Sum of Sine and Cosine Identities.
If the range of the function $f(x) = 2 + \cos(3x) + \frac{\sqrt{3}}{\csc(3x)}$ is $[m, n]$. then $m + n =$ A) 8 B) 3 C) 0 D) 4 E) 6	Sum of Sine and Cosine Identities.

If the range of the function $f(x) = 4\sin x + 3\cos x - 1$ is $[m, n]$, then $m + n =$ (a) -2 (b) -3 (c) -6 (d) -1 (e) -4	Sum of Sine and Cosine Identities.
The minimum value of the function $y = 2 - \sqrt{3}\sin 2x + \cos 2x$ is equal to A) 0 B) -1 C) 1 D) 2 E) - 2	Sum of Sine and Cosine Identities.
The expression $2\sin\frac{x}{3} - 2\sqrt{3}\cos\frac{x}{3}$ can be written as A) $4\sin\left(\frac{x}{3} - \frac{\pi}{3}\right)$ B) $2\sqrt{3}\sin\left(\frac{x}{3} + \frac{\pi}{3}\right)$ C) $4\sin\left(x + \frac{2\pi}{3}\right)$ D) $2\sin\left(\frac{x}{3} + \frac{\pi}{3}\right)$ E) $2\sin\left(\frac{x}{3} - \frac{2\pi}{3}\right)$	Sum of Sine and Cosine Identities.

If $\cos\left(\frac{17\pi}{12}\right) = \frac{\sqrt{a}-\sqrt{b}}{4}$, then $a+b=$ A) 4 B) 5 C) 8 D) 7 E) 6	Sum of Sine and Cosine Identities.
If $\cos(x+y)=1$, and $\cos(x-y)=1$, then $\cos x \cos y =$ (a) 1 (b) -1 (c) 2 (d) -2 (e) 0	Sum of Sine and Cosine Identities.
If the function $y = \frac{1}{2}\sin\left(\frac{1}{2}x\right) - \frac{\sqrt{3}}{2}\cos\left(\frac{1}{2}x\right) + \frac{11}{2}$ is written in the form $y = k\sin(bx+a)+c$, then $k+b+c=$ A) 7 B) 6 C) 5 D) 4 E) 9	Sum of Sine and Cosine Identities.
If the function $y = -\sin 2x - \sqrt{3}\cos 2x$ is written in the form $y = k\sin(2x+a), 0 < a < 2\pi$, then the value of a is A) $\frac{4\pi}{3}$ B) $\frac{2\pi}{3}$ C) $\frac{5\pi}{6}$ D) $\frac{7\pi}{6}$ E) $-\frac{\pi}{3}$	Sum of Sine and Cosine Identities.

If $f(x) = -2\sin\left(\frac{\pi x}{2}\right) + 2\sqrt{3}\cos\left(\frac{\pi x}{2}\right)$, then the phase shift of the graph of $f(x)$ is equal to A) $-\frac{4}{3}$ B) $-\frac{3}{4}$ C) -3 D) $\frac{3}{4}$ E) $\frac{4}{3}$	Sum of Sine and Cosine Identities.
If the range of the function $f(x) = 3 + \sin(2x) + \frac{\sqrt{3}}{\sec(2x)}$ is $[m, n]$ then $m + n =$ A) 6 B) 3 C) 10 D) 4 E) 8	Sum of Sine and Cosine Identities.
If the graph of $y = -\sin 2x + \sqrt{3}\cos 2x$ has a period P and amplitude A, then P · A = A) 2π B) $\frac{\pi}{2}$ C) 2 D) π E) 3π	Sum of Sine and Cosine Identities.

If $f(x) = \sin \pi x + \sqrt{3}\cos \pi x$ is written as $f(x) = k\sin(bx + c)$, then the range R and the period P of $f(x)$ are A) $R = [-2,2]$ and $P = 2$ B) $R = (-2,2)$ and $P = \pi$ C) $R = [0,2]$ and $P = 2$ D) $A = [0,2]$ and $P = 1$ E) $A = [-2,2]$ and $P = -2$	Sum of Sine and Cosine Identities.
The range of the function $f(x) = \sin 3x - \frac{3}{4}\cos 3x - 1$ is A) $\left[\frac{-9}{4}, \frac{3}{4}\right]$ B) $\left[\frac{-9}{2}, \frac{1}{2}\right]$ C) $\left[\frac{-9}{4}, \frac{1}{4}\right]$ D) $\left[\frac{-5}{4}, \frac{3}{4}\right]$ E) $\left[\frac{-7}{4}, \frac{1}{4}\right]$	Sum of Sine and Cosine Identities.
If the function $y = 3\sin x + 3\sqrt{3}\cos x$ is written as $y = k\sin(x + \alpha)$, then $k + \alpha =$ A) $6 + \frac{\pi}{3}$ B) $6 + \frac{2\pi}{3}$ C) $3 + \frac{4\pi}{3}$ D) $3\sqrt{3} + \frac{2\pi}{3}$ E) $6\sqrt{3} + \frac{5\pi}{3}$	Sum of Sine and Cosine Identities.

If $\sin 40^\circ + \cos 40^\circ = k\sin\beta$, then A) $k = \sqrt{2}, \beta = 85^\circ$ B) $k = \sqrt{2}, \beta = -45^\circ$ C) $k = 2, \beta = 40^\circ$ D) $k = \sqrt{2}, \beta = 80^\circ$ E) $k = 2,\ \beta = -80^\circ$	Sum of Sine and Cosine Identities.
The graph of the function $f(x) = -\sin x - \cos x, -\frac{\pi}{4} \le x \le \frac{7\pi}{4}$, is increasing on A) $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$ and $\left[\frac{5\pi}{4}, \frac{7\pi}{4}\right]$ B) $\left[-\frac{\pi}{4}, \frac{3\pi}{4}\right]$ C) $\left[\frac{\pi}{4}, \frac{7\pi}{4}\right]$ D) $\left[\frac{\pi}{4}, \frac{5\pi}{4}\right]$ E) $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$ and $\left[\frac{5\pi}{4}, \frac{7\pi}{4}\right]$	Sum of Sine and Cosine Identities.
If $y = \frac{1}{2}\sin x - \frac{\sqrt{3}}{2\sec x}$, then it can be written as: A) $y = \sin(x - 60^\circ)$ B) $y = 2\sin(x + 60^\circ)$ C) $y = \sin(x - 30^\circ)$ D) $y = \sin(x + 30^\circ)$ E) $y = 2\sin(x - 60^\circ)$	Sum of Sine and Cosine Identities.

The minimum value of the function $f(x) = -\frac{\sqrt{3}}{2}\sin x - \frac{1}{2}\cos x$ is A) -1 B) 0 C) $-\frac{\sqrt{3}}{2}$ D) $-\frac{1}{2}$ E) $\frac{-\sqrt{3}-1}{2}$	Sum of Sine and Cosine Identities.
If $f(x) = 2\sin\frac{x}{3} - 2\sqrt{3}\cos\frac{x}{3}$ is written in the form $A\sin(Bx + C)$ where $A > 0, B > 0$ and $-\frac{\pi}{2} < C < 0$, then the graph of f has: A) Amplitude 4, phase shift π units to the right. B) Amplitude 2, phase shift $\frac{\pi}{3}$ units to the right. C) Amplitude 4, phase shift π units to the left. D) Amplitude - 4, phase shift $\frac{\pi}{3}$ units to the left. E) Amplitude $2 + 2\sqrt{3}$, phase shift π units to the left.	Sum of Sine and Cosine Identities.
If $\cos 55^\circ - \sin 55^\circ = k\cos\theta$, where $k > 0$ and $0 \le \theta \le 180^\circ$, then (a) $k = \sqrt{2},\ \theta = 100^\circ$ (b) $k = 2,\ \theta = 100^\circ$ (c) $k = \sqrt{2},\ \theta = 80^\circ$ (d) $k = \sqrt{2},\ \theta = 70^\circ$ (e) $k = \sqrt{2},\ \theta = 120^\circ$	Sum of Sine and Cosine Identities.

$\left(\tan\frac{5\pi}{12}\right)\left(\tan\frac{\pi}{3}\right)$ A) $3+2\sqrt{3}$ B) $2+\sqrt{3}$ C) $2+3\sqrt{2}$ D) $2\sqrt{3}$ E) $3\sqrt{2}$	Addition/Subtraction Identities.
The value of the expression $\sin 27°\cos 57° - \sin 63°\cos 33°$ is equal to A) $-\frac{1}{2}$ B) $-\frac{\sqrt{3}}{2}$ c) 0 D) $\frac{1}{2}$ E) $\frac{\sqrt{3}}{2}$	Addition/Subtraction Identities.
$\tan\left(\frac{11\pi}{12}\right) =$ A) $\sqrt{3}-2$ B) $\sqrt{3}-1$ C) $\frac{\sqrt{3}-1}{2}$ D) $1-\sqrt{3}$ E) $2-\sqrt{3}$	Addition/Subtraction Identities.

$\sin\left[\cos^{-1}\frac{1}{2}+\tan^{-1}(-3)\right]=$ A) $\frac{\sqrt{10}}{20}(\sqrt{3}-3)$ B) $\frac{\sqrt{10}}{20}(\sqrt{3}+3)$ C) $\frac{\sqrt{10}}{10}(\sqrt{3}-3)$ D) $\frac{\sqrt{10}}{10}(2\sqrt{3}-1)$ E) $\frac{\sqrt{10}}{20}(3-\sqrt{3})$	Addition/Subtraction Identities.
$\cos\left(\frac{\pi}{4}+\tan^{-1}\frac{3}{4}\right)=$ A) $\frac{\sqrt{2}}{10}$ B) $\frac{\sqrt{3}}{10}$ C) $\frac{\sqrt{2}}{4}$ D) $\frac{\sqrt{2}}{2}$ E) $\frac{\sqrt{3}}{2}$	Addition/Subtraction Identities.
If A is the amplitude and P is the period of the function $y=$ $\cos 3x\cos x-\sin 3x\sin x$, then $\pi A+2P=$ A) 2π B) 0 C) 4π D) π E) 3π	Addition/Subtraction Identities.

$\cos 465° =$ A) $\frac{\sqrt{2}-\sqrt{6}}{4}$ B) $\frac{\sqrt{6}-\sqrt{2}}{4}$ C) $\frac{\sqrt{2}-\sqrt{6}}{2}$ D) $\frac{\sqrt{3}-\sqrt{6}}{4}$ E) $\frac{\sqrt{6}-\sqrt{2}}{2}$	Addition/Subtraction Identities.
$\cos\frac{3\pi}{5}\sin\frac{\pi}{10}-\sin\frac{3\pi}{5}\sin\frac{2\pi}{5}=$ A) -1 B) 1 C) $\frac{3}{5}$ D) $-\frac{3}{5}$ E) 0	Addition/Subtraction Identities.
$\sin\left(\tan^{-1}\frac{3}{4}+\cos^{-1}\frac{5}{13}\right)=$ A) $\frac{63}{65}$ B) $-\frac{63}{65}$ C) $\frac{54}{65}$ D) $\frac{33}{65}$ E) $-\frac{33}{65}$	Addition/Subtraction Identities.

If $\sin\alpha = \frac{4}{5}, -\frac{3\pi}{2} < \alpha < -\pi$, and $\cos\beta = -\frac{\sqrt{5}}{5}, \pi < \beta < \frac{3\pi}{2}$, then $\cos(\alpha+\beta) =$ A) $\frac{3\sqrt{5}}{25}$ B) $-\frac{3\sqrt{5}}{25}$ C) $\frac{11\sqrt{5}}{25}$ D) $-\frac{\sqrt{5}}{25}$ E) $\frac{14\sqrt{5}}{25}$	Addition/Subtraction Identities.
If $\tan\alpha = \frac{3}{2}$ and $\tan\beta = -2$, then $\cot\left(\frac{\pi}{2} - \alpha + \beta\right) =$ A) $-\frac{7}{4}$ B) $-\frac{1}{8}$ C) $-\frac{4}{7}$ D) -8 E) -2	Addition/Subtraction Identities.
If $\cos\alpha = \frac{1}{\sqrt{5}}, 0 < \alpha < \frac{\pi}{2}$ and $\cos\beta = \frac{1}{\sqrt{10}}, \frac{3\pi}{2} < \beta < 2\pi$, then $\tan(\alpha - \beta) =$ A) -1 B) $-\frac{1}{7}$ C) $\frac{1}{7}$ D) $\frac{1}{5}$ E) $-\frac{1}{5}$	Addition/Subtraction Identities.

If $\cos\left(\frac{\pi}{2}-\alpha\right)=\frac{5}{13}$ and $\sec\beta=-\frac{5}{3}$, where α is in quadrant I and β is in quadrant II, then $\cos(\alpha+\beta)$ is equal to A) $-\frac{56}{65}$ B) $-\frac{33}{65}$ C) $-\frac{16}{65}$ D) $\frac{56}{65}$ E) $\frac{33}{65}$	Addition/Subtraction Identities.
If $\sin^{-1}x-\sin^{-1}\left(-\frac{3}{5}\right)=\tan^{-1}(-3)$, then $x=$ A) $-\frac{3\sqrt{10}}{10}$ B) $-\frac{9\sqrt{10}}{10}$ C) $\frac{3\sqrt{10}}{10}$ D) $\frac{9\sqrt{10}}{10}$ E) $3\sqrt{10}$	Addition/Subtraction Identities.
If $\tan\alpha=\frac{3}{2}$ and $\tan\beta=-2$, then $\tan(\alpha-\beta)=$ A) $-\frac{7}{4}$ B) $\frac{7}{2}$ C) $-\frac{1}{2}$ D) $\frac{7}{8}$ E) $\frac{1}{4}$	Addition/Subtraction Identities.

$\sin\left(\frac{3\pi}{2}+\theta\right)+\cos\left(\frac{3\pi}{2}-\theta\right)=$ A) $-\sin\theta-\cos\theta$ B) $\cos\theta-\sin\theta$ C) $\sin\theta-\cos\theta$ D) $-2\sin\theta$ E) $\sin\theta+\cos\theta$	Addition/Subtraction Identities.
$\tan 105^\circ=$ A) $-2-\sqrt{3}$ B) $\sqrt{3}-2$ C) $\frac{\sqrt{3}-2}{2}$ D) $\frac{1+\sqrt{3}}{4}$ E) $2\sqrt{3}-1$	Addition/Subtraction Identities.
$\sin 70^\circ\sin 50^\circ-\sin 20^\circ\sin 40^\circ=$ A) $\frac{1}{2}$ B) $\frac{\sqrt{2}}{2}$ C) $-\frac{\sqrt{3}}{2}$ D) $\frac{\sqrt{3}}{2}$ E) $-\frac{\sqrt{2}}{2}$	Addition/Subtraction Identities.

If s and t are angles in standard position, with $\sin s = \frac{4}{5}, \frac{\pi}{2} < s < \pi$, and $\cos t = -\frac{5}{13}, \pi < t < \frac{3\pi}{2}$, then the terminal side of the angle $s + t$ is in the quadrant(s): A) I B) II C) IV D) I or II E) II or III	Addition/Subtraction Identities.
$\sin\left(\tan^{-1}\left(\frac{4}{3}\right) - \cos^{-1}\left(\frac{12}{13}\right)\right) =$ A) $\frac{33}{65}$ B) $\frac{63}{65}$ C) $\frac{7}{65}$ D) $\frac{9}{13}$ E) $-\frac{33}{65}$	Addition/Subtraction Identities.
The expression $\frac{1+\tan 100^\circ \tan(-80^\circ)}{\tan 100^\circ - \tan(-80^\circ)}$ is A) undefined B) equal to 0 C) equal to -1 D) equal to 1 E) equal to $-\sqrt{3}$	Addition/Subtraction Identities.

If $\cos\alpha = -\frac{4}{5}$, where $\frac{\pi}{2} < \alpha < \pi$ and $\cos\left(\frac{\pi}{2} - \beta\right) = -\frac{12}{13}$, where $\pi < \beta < \frac{3\pi}{2}$, then $\sin(\alpha + \beta)$ is equal to A) $\frac{33}{65}$ B) $-\frac{7}{65}$ C) $-\frac{63}{65}$ D) $\frac{61}{65}$ E) $-\frac{16}{65}$	Addition/Subtraction Identities.
$\frac{1 - \tan\frac{13\pi}{9}\tan\frac{2\pi}{9}}{\tan\frac{13\pi}{9} + \tan\frac{2\pi}{9}} =$ A) $-\frac{\sqrt{3}}{3}$ B) $\cot\frac{11\pi}{9}$ C) $-\cot\frac{11\pi}{9}$ D) $-\tan\frac{11\pi}{9}$ E) $\sqrt{3}$	Addition/Subtraction Identities.
$\cos(255°) =$ (a) $\frac{\sqrt{2}-\sqrt{6}}{4}$ (b) $\frac{\sqrt{6}-\sqrt{2}}{4}$ (c) $\frac{\sqrt{6}+\sqrt{2}}{4}$ (d) $\frac{\sqrt{2}-\sqrt{6}}{2}$ (e) $\frac{\sqrt{2}+\sqrt{6}}{2}$	Addition/Subtraction Identities.

The exact value of $\frac{1-\cot(70°)\cot(80°)}{\tan(20°)+\cot(80°)}$ is equal to (a) $\sqrt{3}$ (b) $2\sqrt{2}$ (c) 1 (d) $\frac{\sqrt{3}}{3}$ (e) $\frac{\sqrt{3}}{2}$	Addition/Subtraction Identities.