6.3: (Trigonometric Graphs)

If $y = -2 - 3\sin\left(2x + \frac{2\pi}{3}\right)$, M is the maximum, P the period and S the phase shift then $M + \frac{P+S}{\pi}$ is equal to

A) $\frac{7}{3}$

B) $\frac{-1}{3}$

C) $\frac{4}{3}$

D) $\frac{17}{3}$

E) $\frac{5}{3}$

For $-\frac{\pi}{2} \leq x \leq \frac{9\pi}{2}$, the graph of the function $f(x) = 2\cos\left(\frac{x}{2} - \frac{\pi}{4}\right)$ intersects the line $y = 1$ at

(A) three points

(B) two points

(C) four points

(D) one point

(E) no point

The graph of $y = -\sin(\pi x + \pi), -1 \leq x \leq 1$, is increasing on the interval:

A) $\left(-\frac{1}{2}, \frac{1}{2}\right)$

B) $\left(-1, \frac{1}{2}\right)$

C) $\left(-\frac{1}{2}, 1\right)$

D) $(0,1)$

E) $\left(\frac{1}{2}, 1\right)$

The graph of $y = -\frac{2}{3}\sin\frac{\pi}{4}x$, with $-8 \leq x \leq 0$,

A) is above the x-axis on the interval $(-4,0)$

B) intersects the x-axis at two points

C) has maximum value of $2/3$ in the interval $[-8, -4]$

D) is increasing on the intervals $(-8, -6)$ and $(-2,0)$

E) is decreasing on the interval $(-6, -2)$

The graph of the function $f(x) = -3\sin\left(\frac{1}{3}x\right)$. with $0 \leq x \leq 6\pi$, lies completely below the x-axis on the interval

(a) $(0,3\pi)$

(b) $(0, 6\pi)$

(c) $(3\pi, 6\pi)$

(d) $(4\pi, 6\pi)$

(e) $(\pi, 6\pi)$

Which one of the following statements is FALSE?

A) $f(x) = x + \cos x \sin x$ is an odd function.

B) If $\frac{\pi}{2} < x < \pi$, then $\sin x - \cos x > 0$.

C) $f(x) = \cos x \sin^2 x$ is an odd function.

D) $f(x) = 3 + \cos x$ is an even function.

E) The period of the function $f(x) = -\sin(2\pi x)$ is 1

The graph of the function $y = 3\sin|x|, -\pi \leq x \leq \frac{\pi}{2}$, is decreasing on the interval

A) $(-\pi, 0)$

B) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

C) $\left(-\frac{\pi}{2}, 0\right)$

D) $\left(-\pi, -\frac{\pi}{2}\right)$

E) $\left(0, \frac{\pi}{2}\right)$

The graph of the function $f(x) = -3\sin\left(\frac{\pi}{2} - 2x\right), \frac{\pi}{4} \leq x \leq \frac{5\pi}{4}$ is below the x-axis on

A) $\left(\frac{3\pi}{4}, \frac{5\pi}{4}\right)$

B) $\left(\frac{\pi}{2}, \pi\right)$

C) $\left(\frac{\pi}{2}, \frac{3\pi}{4}\right)$

D) $\left(\frac{\pi}{4}, \pi\right)$

E) $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$

The range of the function $f(x) = 1 + \sqrt{4 - 4\sin^2 x}$, is

A) $[1,5]$

B) $[0,2]$

C) $[-1,3]$

D) $[1,3]$

E) $[-3,5]$

If the range of the function $y = K - 5\sin\left(\frac{\pi}{2}x - \frac{\pi}{2}\right)$ is $[-7,3]$, then $K =$

A) -2

B) $\pi + 2$

C) 0

D) 4

E) $2 - \pi$

The graph of $y = 3\sin|\pi x|$, with $-1 \leq x \leq 1$, is increasing on the interval

A) $\left(-1, -\frac{1}{2}\right) \cup \left(0, \frac{1}{2}\right)$

B) $\left(-\frac{1}{2}, 0\right) \cup \left(\frac{1}{2}, 1\right)$

C) $\left(-1, \frac{1}{2}\right)$

D) $\left(-\frac{1}{2}, \frac{1}{2}\right)$

E) $\left(-\frac{1}{2}, 1\right)$

Which one of the following statements is FALSE about the graph of the function $f(x) = -\frac{1}{2}\sin\left(\frac{\pi x}{2}\right), -2 \leq x \leq 2$?

A) is increasing on the interval $(-1,1)$.

B) has three x-intercepts.

C) lies above the x-axis on the interval $(-2,0)$.

D) lies below the x-axis on the interval $(0,2)$.

E) passes through the origin.

The graph of the function $f(x) = 2\sin(4x + \pi)$, where $-\frac{\pi}{4} \leq x \leq \frac{\pi}{4}$,

A) has three x-intercepts

B) has no y-intercept

C) is increasing on the interval $\left(-\frac{\pi}{8}, \frac{\pi}{8}\right)$

D) is below the x-axis in the interval $\left(-\frac{\pi}{4}, 0\right)$

E) is above the x-axis in the interval $\left(0, \frac{\pi}{4}\right)$

Which one of the following statements is TRUE about the function $f(x) = -1 + \frac{1}{2}\sin(2x - 3\pi)$?

A) The range of the function is $\left[-\frac{3}{2}, -\frac{1}{2}\right]$

B) The vertical translation of the graph of the function is $\frac{1}{2}$ unit up

C) The period of the function is 2π

D) The phase shift of the function is 3π unit to the right

E) The amplitude of the function is $\frac{3}{2}$

The graph of $y = \frac{5}{2} - \cos\left[3\left(x - \frac{\pi}{6}\right)\right]$ has:

A) range $\left[\frac{3}{2}, \frac{7}{2}\right]$

B) period π

C) phase shift $\frac{\pi}{2}$ to the left

D) amplitude 3

E) y-intercept $-\frac{5}{2}$

The number of x-intercepts of the graph of $y = -2\cos \pi x, -\frac{3}{2} \leq x < \frac{5}{2}$. is

A) 5

B) 1

C) 3

D) 4

E) 2

The range of the function $y = 2 - |3\cos(3x - \pi)|$, is

A) $[-1,2]$

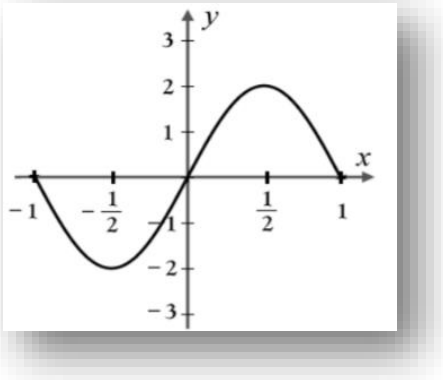
B) $[-3,0]$

C) $(-\infty, -3] \cup [0, \infty)$

D) $[1,4]$

E) $(-\infty, 1] \cup [4, \infty)$

If the adjacent figure represents the graph of $y = -2\cos(bx + c)$, then



A) $b = \pi$ and $c = \frac{\pi}{2}$

B) $b = \pi$ and $c = -\frac{\pi}{2}$

C) $b = 2\pi$ and $c = -\frac{\pi}{4}$

D) $b = 2\pi$ and $c = \frac{\pi}{4}$

E) $b = \pi$ and $c = \frac{\pi}{4}$

The graph of the function $f(x) = 3\cos(2\pi x)$ over $[-1,1]$ intersects the line $y = -2$ at

A) 5 points

B) 7 points

C) 8 points

D) 3 points

E) 4 points

The graph of the function $f(x) = -2\cos\left(\frac{\pi}{4}x - \frac{\pi}{2}\right), 0 \leq x \leq 10$ is increasing on the interval

A) $[2,6]$

B) $[0,4]$

C) $[0,4] \cup [8,10]$

D) $[8,10]$

E) $[3,4] \cup [9,10]$

If the adjacent figure represents the graph of the function $y = a\cos(kx + b)$, then $a + k + \frac{b}{\pi} =$

A) 0

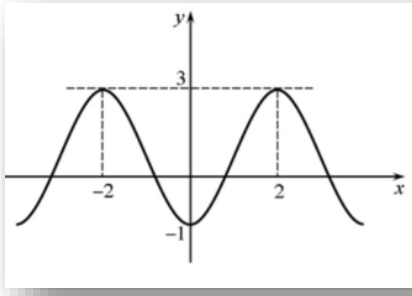
B) 1

C) -1

D) $\frac{\pi-1}{2}$

E) $\frac{\pi^2-1}{2}$

If the adjacent figure represents the graph of $y = a\cos(bx) + 1$, then $2b - \pi a =$



A) 3π

B) 2π

C) -2π

D) -3π

E) π

If the graph of the function $f(x) = 2\cos(bx + c), b > 0$ and $-\frac{\pi}{2} \leq c \leq \frac{\pi}{2}$, has period $\frac{2\pi}{3}$ and passes through the point $(0,2)$, then $b + c =$

A) 3

B) 0

C) 4

D) 5

E) 2

The range of the function $f(x) = 3 - |\cos(x - \pi)|$ is

A) $[2,3]$

B) $[2,4]$

C) $[-3,3]$

D) $(2,4)$

E) $(2,3)$

Which one of the following statements is FALSE about the function $f(x) = 5\cos\left(3x - \frac{\pi}{4}\right)$?

(a) The graph of $f(x)$ has y-intercept at $y = -1$

(b) The range of $f(x)$ is $[-5,5]$

(c) The horizontal shift of the graph of $f(x)$ is $\frac{\pi}{12}$ units to the right

(d) The amplitude of the graph of $f(x)$ is 5

(c) The period of $f(x)$ is $\frac{2\pi}{3}$

The graph of the function $f(x) = -2\sin(3x)$ over $[0,2\pi]$ intersects the line $y = \frac{3}{2}$ at

A) 3 points.

B) 7 points.

C) 6 points.

D) 2 points.

E) 5 points

The equation of the function whose part of its graph is drawn below is

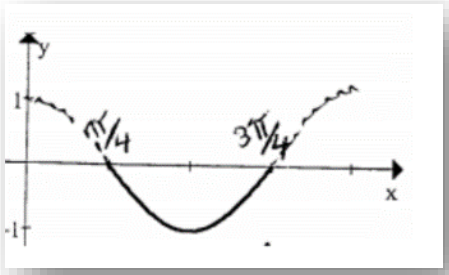
A) $y = -\cos 4x$

B) $y = -\sin 3x$

C) $y = -\sin 2x$

D) $y = \cos 2x$

E) $y = -\cos 2x$



If A is the amplitude, P is the period and F is the phase shift of the graph of the function $f(x) = -3\cos\left(\frac{\pi x}{5} - 2\pi\right)$, then $\frac{-2A+P-F}{2} =$

A) $-3 - 10\pi$

B) -3

C) 3

D) $3 + 10\pi$

E) $-3 + 10\pi$

The range R and the period P of the function $y = -\left|3\sin\frac{x}{2}\right|$ are given by

(a) $R = [-3,0],\ P = 2\pi$

(b) $R = [-3,3],\ P = 2\pi$

(c) $R = [-3,0],\ P = 4\pi$

(d) $R = [-3,0],\ P = \pi$

(e) $R = [-3,0],\ P = \frac{\pi}{2}$

The graph of $y = -\frac{1}{2}\sin \pi x$

A) has a maximum of $\frac{1}{2}$ in the interval $[3,4]$

B) is decreasing on the interval $[1,2]$

C) is increasing on the interval $[0,1]$

D) has a minimum of $-\frac{1}{2}$ in the interval $[-1,0$

E) has a minimum of $-\frac{1}{2}$ in the interval $[1,2]$

The number of points of intersection of $y = 1$ and $y = -2\sin\frac{\pi x}{3}$ in the interval $[-3,9]$

A) 2

B) 4

C) 5

D) 3

E) 6

Let $f(x) = -\frac{1}{3}\cos(2\pi x)$ and A be its amplitude, P be its period and (a, b) be the highest point of the function in the interval $[0,1]$. Then, $A + P + a - b =$

A) $\frac{3}{2}$

B) $\frac{5}{2}$

c) $\frac{3\pi}{2}$

D) $1 + \frac{3\pi}{2}$

E) $\frac{5\pi-1}{2}$

The range of the function $f(x) = -\left|3\sin\frac{2x}{3}\right|$ is

A) $[-3,0]$

B) $[0,3]$

C) $[-3,3]$

D) $[-1,0]$

E) $[-1,1]$

The function $y = \cos\left(\frac{x}{3} - \frac{\pi}{3}\right)$, for $-\frac{13\pi}{2} \leq x \leq \frac{17\pi}{2}$ has

A) three maximum values

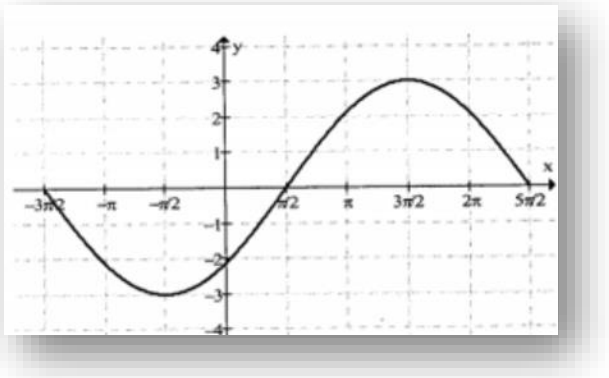
B) two maximum values

C) four maximum values

D) five maximum values

E) six maximum values

If the adjacent figure represents the graph of the function $y = a\sin(bx + c)$, $-\frac{3\pi}{2} \leq x \leq \frac{5\pi}{2}$, then



A) $a = -3, b = \frac{1}{2}, c = \frac{3\pi}{4}$

B) $a = -3, b = 2, c = -\frac{3\pi}{2}$

C) $a = 3, b = \frac{1}{2}, c = -\frac{3\pi}{4}$

D) $a = 3, b = 4, c = 3\pi$

E) $a = -3, b = \frac{1}{4}, c = \frac{3\pi}{8}$

The graph of the function $y = \frac{1}{2}\cos\frac{\pi}{2}x$ increases over the interval

A) $(2,4)$

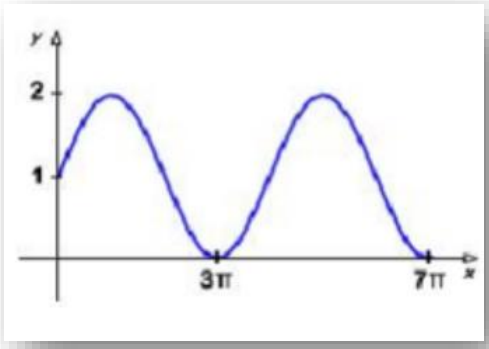
B) $(0,2)$

C) $(3,5)$

D) $(1,3)$

E) $(2,5)$

The adjacent figure represents part of the graph of



A) $y = \sin\left(\frac{1}{2}x\right) + 1$

B) $y = \cos\left(\frac{1}{2}x\right) + 1$

C) $y = 2\sin(x) + 1$

D) $y = 2\cos(x) + 1$

E) $y = \sin(2x) + 1$

The graph of $y = -|\sin \pi x|$ over the interval $\left[\frac{1}{2}, \frac{3}{2}\right]$ intersects the line $y = -\frac{1}{2}$ at:

(a) 2 points

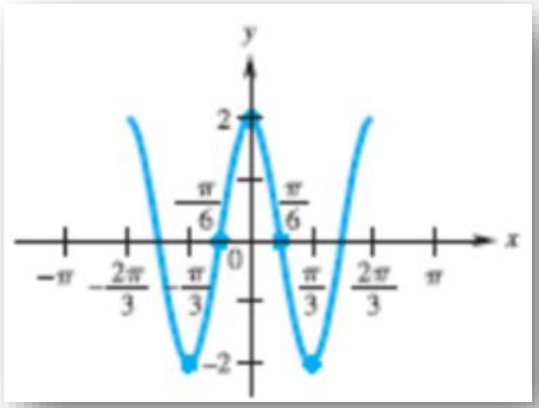
(b) 1 point

(c) 3 points

(d) 4 points

(e) no point

If the adjacent figure represents the graph of the function $y = a\cos(bx + c), -\frac{2\pi}{3} \leq x \leq \frac{2\pi}{3}$ then



A) $a = -2, b = 3, c = \pi$

B) $a = 2, b = \frac{1}{3}, c = \pi$

C) $a = -2, b = 3, c = -\frac{2\pi}{3}$

D) $a = -2, b = \frac{2}{3}, c = \frac{2\pi}{3}$

E) $a = 2, b = \frac{2}{3}, c = \frac{\pi}{3}$

Over the interval $\left[-\frac{\pi}{4}, \frac{15\pi}{4}\right]$, the function $y = -\sin\left(\frac{x}{2} + \frac{\pi}{8}\right)$ is decreasing on the interval(s)

A) $\left[-\frac{\pi}{4}, \frac{3\pi}{4}\right]$ and $\left[\frac{11\pi}{4}, \frac{15\pi}{4}\right]$

B) $\left[\frac{3\pi}{4}, \frac{11\pi}{4}\right]$

C) $\left[-\frac{\pi}{4}, \frac{5\pi}{4}\right]$ and $\left[\frac{11\pi}{4}, \frac{15\pi}{4}\right]$

D) $\left[0, \frac{3\pi}{4}\right]$ and $\left[\frac{5\pi}{4}, \frac{11\pi}{4}\right]$

E) $\left[-\frac{\pi}{4}, \frac{3\pi}{4}\right]$ and $\left[\frac{7\pi}{4}, \frac{11\pi}{4}\right]$

The function $y = -2 + 5\cos(2x + 3\pi)$ has

A) range $= [-7,3]$, phase shift $= \frac{3\pi}{2}$ units to the left

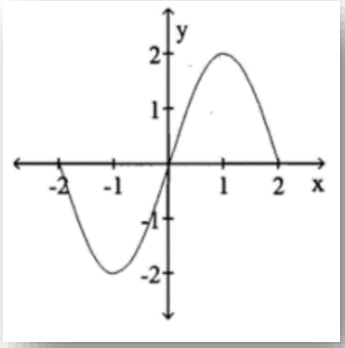
B) range $= [-5,5]$ phase shift $= 3\pi$ units to the left

C) range $= [-7,3]$ phase shift $= \frac{3\pi}{2}$ units to the right

D) range $= [-2,2]$, phase shift $= 3\pi$ units to the right

E) range $= [-7,7]$, phase shift $= \frac{3\pi}{2}$ units to the left

$y = -2\cos(bx + c)$, then



A) $b = \frac{\pi}{2}$ and $c = \frac{\pi}{2}$

B) $b = \frac{\pi}{2}$ and $c = \frac{\pi}{4}$

C) $b = \pi$ and $c = +\frac{\pi}{2}$

D) $b = 2n$ and $c = -\frac{\pi}{4}$

E) $b = 2\pi$ and $c = -\pi$

Which one of the following statements is TRUE?

A) The equation $\sin x = 2$ has no solution in the interval $\frac{\pi}{2} \leq x \leq \frac{3\pi}{2}$.

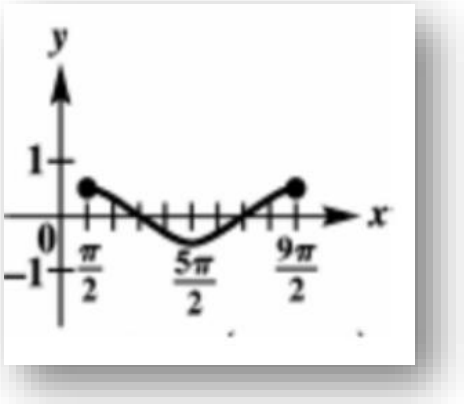
B) Domain of $y = \sin(x + \pi)$ is $[-\pi, \infty)$.

C) The period of the graph of $y = \sin[\pi(2x - 1)]$ is π.

D) The range of the function $y = 2\sin(x - \pi) - 1$ is $[-2,2]$.

E) $(\sec x)(\sin x) = 1$.

$y = \frac{1}{2}\cos(bx + c), \frac{\pi}{2} \leq x \leq \frac{9\pi}{2}$ then



A) $b = \frac{1}{2}, c = -\frac{\pi}{4}$

B) $b = \frac{1}{2}, c = -\frac{\pi}{2}$

C) $b = 2, c = -\frac{\pi}{2}$

D) $b = \frac{1}{4}, c = \frac{\pi}{2}$

E) $b = \frac{1}{4}, c = \frac{\pi}{4}$

The graph of the function $y = 2\sin\frac{1}{4}x$, for $-8\pi \leq x \leq 8\pi$, has

A) two maximum values and five x-intercepts

B) three maximum values and four x-intercepts

C) four maximum values and three x-intercepts

D) five maximum values and two x-intercepts

E) three maximum values and three x-intercepts

For $-8 \leq x \leq 8$, the graph of the function $y = -\frac{3}{2}\sin\left(\frac{\pi}{4}x\right)$ lies below the x-axis in the interval(s) [Hint: Sketch the graph]

A) $(-8,-4)$ and $(0,4)$

B) $(-4,0)$ and $(4,8)$

C) $(-6,-2)$ and $(2,6)$

D) $(-4,0)$ and $(0,4)$

E) $(-4,4)$

The graph of the function $y = 3\cos\left(\frac{1}{2}x - \frac{\pi}{4}\right)$, on the interval $\left[-\frac{7\pi}{2}, \frac{9\pi}{2}\right]$ intersects the line $y = 2$ at

A) four points

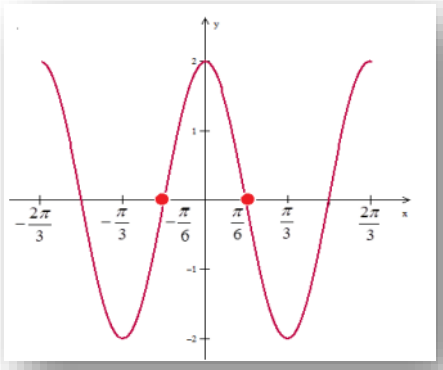
B) six points

C) three points

D) five points

E) no points

$y = -2\cos(bx + c), -\frac{2\pi}{3} \leq x \leq \frac{2\pi}{3}$ and $b > 0$, then



A) $b = 3, c = \pi$

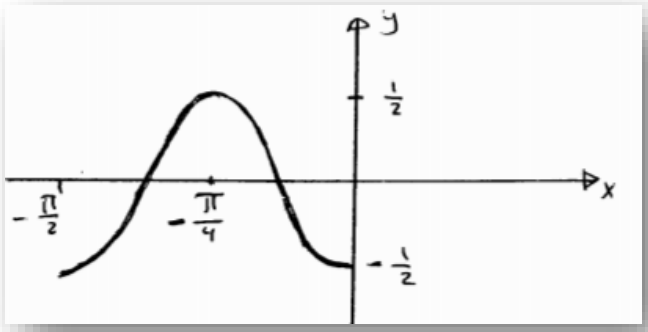
B) $b = \frac{1}{3}, c = \pi$

C) $b = 3, c = -\frac{2\pi}{3}$

D) $b = \frac{2}{3}, c = \frac{2\pi}{3}$

E) $b = \frac{2}{3}, c = \frac{\pi}{3}$

If the adjacent figure represents the graph of $y = a\cos(bx + c)$ over one period where $0 < c \leq 2\pi$ and $a < 0$, then $8a + b + c =$



A) 2π

B) -2π

C) $\frac{\pi}{2}$

D) $-\pi$

E) π

The graph of $y = -4\sin(2x - \pi)$ is below x-axis on the interval :

A) $\left(\frac{\pi}{2}, \pi\right)$

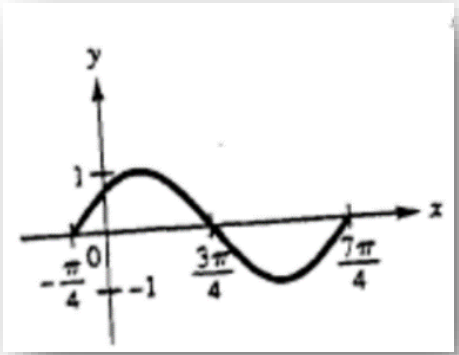
B) $(0, \pi)$

C) $\left(-\pi, -\frac{\pi}{2}\right)$

D) $\left(0, \frac{\pi}{2}\right)$

E) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

The adjacent graph represents a part of the graph of



A) $y = \sin\left(x + \frac{\pi}{4}\right)$

B) $y = \sin\left(x - \frac{\pi}{4}\right)$

C) $y = \cos\left(x + \frac{\pi}{4}\right)$

D) $y = 1 - \cos\left(x - \frac{\pi}{4}\right)$

E) $y = -1 - \sin\left(x - \frac{\pi}{4}\right)$

If $f(x) = a\sin bx, b > 0$ has a period of $\frac{2\pi}{3}$ and $f\left(\frac{\pi}{2}\right) = 2$, then a is:

A) -2

B) 2

C) 2π

D) $-\pi$

E) π

The graph of $y = \frac{5}{2} - \cos\left[3\left(x - \frac{\pi}{6}\right)\right]$ has:

A) range $\left[\frac{3}{2}, \frac{7}{2}\right]$

B) period π

C) phase shift $\frac{\pi}{2}$ to the left.

D) amplitude 3

E) y-intercept $-\frac{5}{2}$

The range of the function $f(x) = 2 - \left|\cos\left(-\frac{\pi x}{4}\right)\right|$ is equal to:

A) $[1,\ 2]$

B) $[0,\ 1]$

C) $[2,\ 3]$

D) $[-1,\ 0]$

E) $[-2,\ 0]$