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

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

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

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

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

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

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

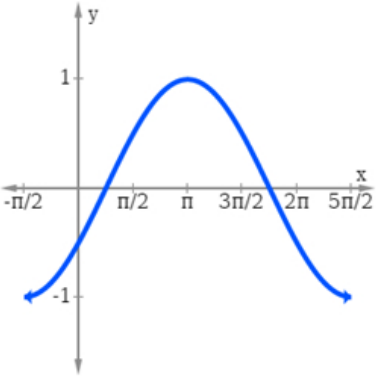
A) 0

B) 1

C) -1

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

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



3) The sum of all the vertical asymptotes of the graph of $y = -\csc\left(\frac{x}{3} - \frac{\pi}{6}\right)$ in the interval $[-4\pi, 2\pi]$, is

A) -2π

B) 4π

C) 2π

D) $-\pi$

E) π

4) The adjacent figure represents part of the graph of

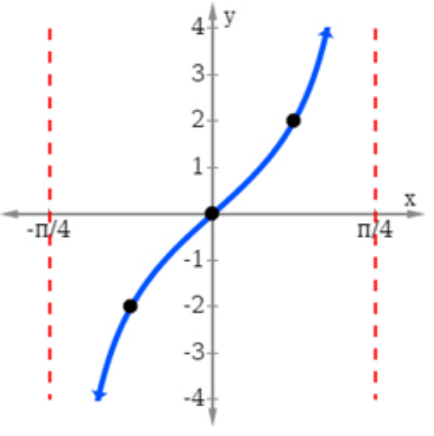
A) $y = -2\cot\left(2x + \frac{\pi}{2}\right)$

B) $y = -2\cot\left(x + \frac{\pi}{4}\right)$

C) $y = 2\tan\left(2x + \frac{\pi}{2}\right)$

D) $y = -2\tan(2x)$

E) $y = 2\tan\left(x + \frac{\pi}{4}\right)$



5) The graph of the function $f(x) = -\sec\left(\frac{\pi}{2}x\right)$, over the interval $[0, 4]$, intersects the line $y = 1$ at

A) 1 point

B) 2 points

C) 5 points

D) 3 points

E) 4 points

6) The exact value of $\cos^{-1}\left(\cos\frac{10\pi}{3}\right)$, is

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

B) $\frac{\pi}{3}$

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

D) $\frac{10\pi}{3}$

E) undefined

7) The range of $y = -\cos^{-1}(1 - 3x) - \pi$, is

A) $[-2\pi, -\pi]$

B) $[\pi - 1, \pi + 1]$

C) $[-\frac{3\pi}{2}, -\frac{\pi}{2}]$

D) $[0, \frac{2}{3}]$

E) $[-\frac{3\pi}{2}, \frac{\pi}{2}]$

8) The expression $\frac{\cos x}{1 - \sin x} - \tan x$ simplifies to

A) $\sec x$

B) $-\sec x$

C) $\csc x$

D) $-\csc x$

E) $2\tan x$

9) $\ln\left(e^{\sin^2 x}\, e^{\cos^2 x}\right) =$

A) 1

B) 0

C) $e^{\sec x}$

D) $e^{\csc x}$

E) $2\cos x + 2\sin x$

10) If the function $y = -\sin 2x - \sqrt{3}\cos 2x$ is written in the form $y = k\sin(2x + \alpha)$, $0 < \alpha < 2\pi$, then the value of α is

A) $\frac{4\pi}{3}$

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

C) $\frac{5\pi}{6}$

D) $\frac{7\pi}{6}$

E) $-\frac{\pi}{3}$

11) $\tan\left(\frac{11\pi}{12}\right) =$

A) $\sqrt{3} - 2$

B) $\sqrt{3} - 1$

C) $\frac{\sqrt{3} - 1}{2}$

D) $1 - \sqrt{3}$

E) $2 - \sqrt{3}$

12) If P is the period and A is the amplitude of the function $y = 2\sin\pi x \cos\pi x$, then A + P =

A) 2

B) 0

C) 3

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

E) $1 + \sqrt{5}$

13) $\sqrt{\dfrac{1 - \sin\dfrac{17\pi}{5}}{2}}$ =

A) $\sin\dfrac{9\pi}{20}$

B) $\cos\dfrac{11\pi}{20}$

C) $-\sin\dfrac{\pi}{10}$

D) $-\cos\dfrac{\pi}{10}$

E) $\cos\dfrac{\pi}{10}$

14) If $0 \le x < 2\pi$, then the sum of all solution(s) of the equation $\sin^2 x - \sin x - 2 = 0$, is equal to

A) $\dfrac{3\pi}{2}$

B) π

C) $\dfrac{5\pi}{3}$

D) 2π

E) $\dfrac{5\pi}{2}$

15) If $0^\circ \le x < 360^\circ$, then the number of solutions of the equation $4 \tan x \sin^2 x + \tan x - 4\sqrt{3} \sin^2 x - \sqrt{3} = 0$, is equal to

A) 2

B) 3

C) 4

D) 5

E) 6

16) The sum of the solution(s) of the equation $\sqrt{2} \sec \frac{x}{2} + 2 = 0$, in the interval $[0, 2\pi)$, is

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

B) $\frac{3\pi}{4}$

C) 4π

D) 2π

E) π

17) The equation $\cos x \cos 3x + \sin x \sin 3x = \frac{1}{2}$, $-\pi \le x < 0$, has

A) 2 solutions

B) 1 solution

C) 3 solutions

D) 4 solutions

E) 5 solutions

18) In the adjacent figure, the magnitude M and the direction θ of the vector u , is

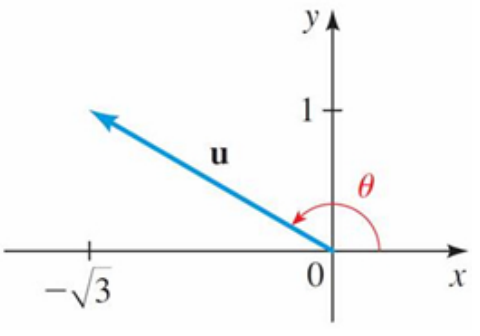
A) $M = 2$, $\theta = \frac{5\pi}{6}$

B) $M = \sqrt{2}$, $\theta = \frac{5\pi}{6}$

C) $M = \sqrt{2}$, $\theta = \frac{2\pi}{3}$

D) $M = 2$, $\theta = \frac{2\pi}{3}$

E) $M = 2$, $\theta = \frac{11\pi}{6}$



19) If the vectors $u = (k - 1)i + j$ and $v = 3i + (k + 1)j$ are perpendicular, then k is equal to

A) $\frac{1}{2}$

B) $\frac{5}{8}$

C) 2

D) 4

E) $\frac{1}{4}$

20) If α is the smallest positive angle between the vectors $u = \langle 3, -4 \rangle$ and $v = \langle -2, 1 \rangle$, then $\cot \alpha =$

A) -2

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

C) -3

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

E) $\frac{1}{2}$