1) $\sin\left(\dfrac{\pi}{2} + x\right) + \cos\left(\dfrac{3\pi}{2} - x\right) =$

   A) $\sin x$

   B) $\cos x - \sin x$

   C) $\cos x$

   D) $\cos x + \sin x$

   E) $\sin x - \cos x$

2) Let $u = -\sqrt{3}\,i + k\,j$ and v is a vector with magnitude 2 and direction

    angle 150°. If u and v are perpendicular (orthogonal) vectors, then t $k =$

   A)   0

   B) $- 4$

   C)   3

   D) $- 3$

   E) $- 1$

3) The graph of the function $f(x) = -2 \tan\left(\frac{\pi}{4}x - \frac{\pi}{2}\right)$, $0 < x < 8$ is above the

x- axis on

A) (0, 4)

B) (2, 4) ∪ (6, 8)

C) (1, 3) ∪ (5, 7)

D) (0, 3) ∪ (5, 8)

E) (0, 2) ∪ (4, 6)

4) Which one of the following statements is FALSE ?

A) The domain of $y = \cos^{-1} x$ is $[-1,1]$.

B) The range of $y = \tan x$ is the set of all real numbers.

C) The range of $y = \cos^{-1} x$ is $[0, \pi]$.

D) The range of $y = \sin^{-1} x$ is $[-1, 1]$.

E) The domain of $y = \tan^{-1} x$ is the set of all real numbers.

5) The sum of all the solutions of the equation

$(2\sin x - \cos x)(1 + \cos x) = \sin^2 x$, $0 \le x \le 2\pi$, is equal to

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

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

C) 3π

D) π

E) 2π

6) $\dfrac{\tan(25^\circ) + \tan(20^\circ)}{1 + \cot(115^\circ)\ \tan(20^\circ)} =$

A) $\sqrt{3}$

B) 2

C) -1

D) $-\sqrt{3}$

E) 1

7) If α and β are two angles in the second quadrant with $\cos \alpha = -\dfrac{3}{5}$

and $\tan \beta = -\dfrac{5}{12}$, then $\sin (\alpha + \beta) =$

A)　$-\dfrac{33}{65}$

B)　$\dfrac{33}{65}$

C)　$-\dfrac{63}{65}$

D)　0

E)　$\dfrac{63}{65}$

8)　$\sin (15^\circ) \left(1 - 2 \sin^2(7.5^\circ)\right) =$

A)　$\dfrac{1}{8}$

B)　$\dfrac{1}{2}$

C)　1

D)　$\dfrac{1}{4}$

E)　2

9) $\tan\left[\frac{1}{2}\sin^{-1}\left(-\frac{3}{5}\right)\right]$ =

    A) $\frac{1}{3}$

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

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

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

    E) 3

10) If the range of the function $f(x) = 4\sin\theta + 3\cos\theta + d$, is $[-3, 7]$,

    then $d =$

    A)   3

    B)   1

    C)   - 3

    D)   2

    E)   - 2

11) $\dfrac{\sin^2 x + \cot^2 x - 1}{\cos^2 x} =$

     A) $\tan^2 x$

     B) $\cos^2 x$

     C) $\sin^2 x$

     D) $\cot x$

     E) $\cot^2 x$

12) If the domain of the function $f(x) = \dfrac{3\pi}{2} - \dfrac{\pi}{2}\sin^{-1}(2x - 3)$ is $[m, n]$

     then $m + n =$

     A)   4

     B)   0

     C)   3

     D)   1

     E)   2

13) $\cos^{-1}\left(\cos \dfrac{17\pi}{5}\right) =$

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

B) $-\dfrac{2\pi}{5}$

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

D) $\dfrac{4\pi}{5}$

E) $\dfrac{17\pi}{5}$

14)   If θ is the smallest angle between the vectors $u = <-3, 4>$ and
$v = 12\,i + 5\,j$, then $\cos\theta =$

A) $-\dfrac{65}{16}$

B) $\dfrac{65}{16}$

C) $-\dfrac{65}{56}$

D) $-\dfrac{16}{65}$

E) $\dfrac{65}{56}$

15) The number of vertical asymptotes of the graph of $f(x) = \sec\left(\frac{\pi}{2}x - \pi\right)$

in the interval $(-3, 3)$ is

A) 1

B) 4

C) 3

D) 2

E) 5

16) If $\begin{cases} 4\sin\alpha + 2\cos\beta = 3 \\ 2\sin\alpha - 4\cos\beta = -1 \end{cases}$, then $\sin\alpha + \cos\beta =$

A) $-\sqrt{2}$

B) 0

C) $\sqrt{2}$

D) -1

E) 1

17) If (a, b) is a solution of the system $\begin{cases} x + y = 1 \\ (x - 1)^2 + y^2 = 72 \end{cases}$, then $ab =$

A) $- 42$

B) $- 6$

C) $- 90$

D) $- 56$

E) 42

18) Which one of the following statements is TRUE ?

A) The vector $< \sin x, \cos x >$ is a unit vector.

B) The two vectors $\mathbf{i}$ and $-\mathbf{i}$ are perpendicular.

C) The dot product between $i + j$ and $i - j$ is 2.

D) The direction angle of the vector $i + j$ is 90°.

E) The vector $< \dfrac{1}{2}, \dfrac{1}{2} >$ is a unit vector.

19) If $8 \sin x - \cos x = 8 \csc x - \sec x$, then $\tan x =$

A) 8

B) 2

C) - 2

D) 4

E) 1

20) The number of solutions of the equation
$$\frac{\tan x}{\cos x} + \frac{1}{1+ \sin x} = \frac{4}{3}$$ in the interval $[0, 2\pi)$ is

A) 5

B) 4

C) 6

D) 2

E) 3

1) B
2) D
3) E
4) D
5) E
6) E
7) C
8) D
9) D
10) D
11) E
12) C
13) C
14) D
15) D
16) E
17) A
18) A
19) B
20) B