TRIGONOMETRY II

JAN 1997

1. Which expression is equivalent to $\cot\theta + \tan\theta$?

   A. $\dfrac{1}{\sin\theta\cos\theta}$ B. $\dfrac{\cos\theta+\sin\theta}{\sin\theta\cos\theta}$

   C. 1 D. 2

2. Which expression is equivalent to $\dfrac{1-\cos 2\theta}{\sin 2\theta}$?

   A. $\tan\theta$ B. $\cot\theta$

   C. $-\tan\theta$ D. $-\cot\theta$

3. How many solutions does the following equation have over the interval $0° \le \theta < 360°$?

   $(2\sin\theta + 5)(3\cos\theta + 3)(\tan^2\theta - 2) = 0$ A. 4 B. 5 C. 6 D. 7

4. Solve: $3\cos^2 x - 5\cos x - 2 = 0$, where $0 \le x < 2\pi$ (accurate to at least 2 decimal places)

JUNE 1997

5. Simplify: $\dfrac{2\tan x}{\cos^2 x + \sin^2 x + \tan^2 x}$ A. $2\sin x$ B. $\sin 2x$ C. $\tan 2x$ D. $2\cot x$

6. Solve: $2\cos^2 x - 5\cos x + 2 = 0$, $0 \le x < 2\pi$ (accurate to 2 decimal places):

   A. 0.00 B. 1.05 , 5.24 C. 2.09 , 4.19 D. 1.05 , 2.09 , 4.19 , 5.24

7. How many solutions does $\cos 3x = -1$ have over the interval $0 \le x < 2\pi$?

   A. 1 B. 2 C. 3 D. 6

8. Which expression is equivalent to $4\sin 6\theta \cos 6\theta$?

   A. $\sin 6\theta$ B. $\sin 12\theta$ C. $2\sin 3\theta$ D. $2\sin 12\theta$

JAN 1998

9. Simplify: $2\cot x \sin^2 x$ A. $\dfrac{\sin 2x}{2}$ B. $\sin 2x$ C. $\dfrac{2\sin^3 x}{\cos x}$ D. $\cos 2x \sin x$

10. Solve for x, where $0 \le x < 2\pi$, (accurate to 2 decimal places): $2\sec^2 x + 5\sec x - 3 = 0$

    A. 1.23 , 5.05 B. 1.91 , 4.37 C. 3.48 , 5.94 D. 1.05 , 1.91 , 4.37 , 5.23

11. Solve over the real numbers: $\cos\frac{\pi}{2}x = 1$

A. $2n$ (n is an integer)
B. $4n$ (n is an integer)
C. $2+2n$ (n is an integer)
D. $2+4n$ (n is an integer)

12. Prove the identity.

$$\frac{1-\cos\theta}{\sin^2\theta} = \frac{1}{1+\cos\theta}$$

JUN 1998

13. Determine all restrictions for $\frac{\cot\theta}{1-\sin\theta}$.

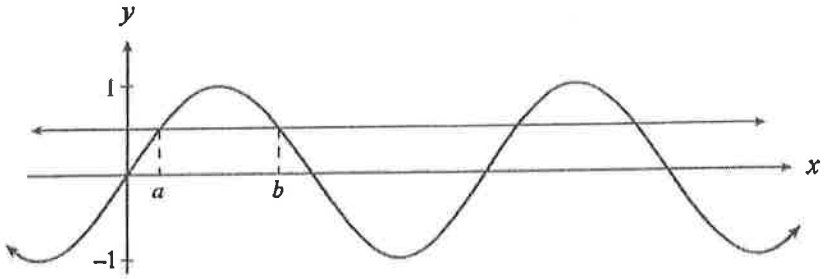
A. $\sin\theta \neq 1$
B. $\sin\theta \neq 0$
C. $\sin\theta \neq 1$, $\cos\theta \neq 0$
D. $\sin\theta \neq 0$, $\sin\theta \neq 1$

14. Given $\csc^2\theta + \sin^2\theta = 5.34$,

find the value of $\frac{1}{\csc^2\theta} + \frac{1}{\sin^2\theta}$.

A. 0.19
B. 2.27
C. 5.14
D. 5.34

15. Solve $\sin\pi x > \frac{1}{2}$ over the real numbers, using the graphs of $y = \sin\pi x$ and $y = \frac{1}{2}$ shown below. Express the answer in terms of a and b.



A. $a+n < x < b+n$
B. $a+2n < x < b+2n$
C. $a+\pi < x < b+\pi$
D. $a+2\pi < x < b+2\pi$

16. Prove the identity:

$$\frac{\csc\theta}{\tan\theta+\cot\theta} = \cos\theta$$

JAN 1999

17. Which expression is equivalent to $\dfrac{\sin\theta + \cos\theta\cot\theta}{\cot\theta}$?

A. $\csc\theta$
B. $\cos\theta$
C. $\sin\theta$
D. $\sec\theta$

18. Solve: $\sin 2\theta + 2\cos\theta = 0$, where $0 \le \theta < 2\pi$

A. 4.71
B. 1.57, 4.71
C. 1.57, 3.14
D. 1.57, 3.14, 4.71

19. Let A be an angle in standard position such that $0 < A < \frac{\pi}{2}$. If $\sin A = n$ and $\cos A = m$, determine an expression for $\sin(\pi + A) + \cos(\pi + A)$.

A. $-m - n$
B. $-m + n$
C. $m - n$
D. $m + n$

20. Prove the following identity:

$$\frac{\cot\theta}{\csc\theta - 1} = \frac{\csc\theta + 1}{\cot\theta}$$

JUN 1999

G.C

~~21.~~ How many solutions does $\tan^2 x + 5\cos x - 8 = 0$ have over the interval $0 \le x < 2\pi$?

A. 1
B. 2
C. 3
D. 4

22. Determine all restrictions for the expression:

$$\frac{\sec x}{4\sin^2 x - 1}$$

A. $\sin x \ne \pm\frac{1}{4}$

B. $\sin x \ne \pm\frac{1}{2}$

C. $\cos x \ne 0$, $\sin x \ne \pm\frac{1}{4}$

D. $\cos x \ne 0$, $\sin x \ne \pm\frac{1}{2}$

23. Solve: $\tan^2 x = \tan x$, $0 \le x < 2\pi$

A. 0, 0.79
B. 0.79, 3.93
C. 0, 0.79, 3.14, 3.93
D. 0, 2.36, 3.14, 5.50

24. Prove the identity:

$$\frac{\sin\theta + \tan\theta}{1 + \cos\theta} = \frac{\sin 2\theta}{2\cos^2\theta}$$

JAN 2000

25. State the restriction(s) for $\cot x$.

A. $\sin x \neq 0$
B. $\cos x \neq 0$
C. $\cos x \neq 0,\ \sin x \neq 0$
D. no restriction(s)

26. Simplify: $\sin 5m \cos m + \cos 5m \sin m$

A. $\cos 4m$
B. $\cos 6m$
C. $\sin 4m$
D. $\sin 6m$

27. Solve: $2\sin x \cos x + \sin x = 0\ ,\ 0 \leq x < 2\pi$

A. 0, 3.14
B. 2.09, 4.19
C. 0, 2.09, 3.14, 4.19
D. 0, 2.09, 3.14, 5.24

28. Simplify: $\dfrac{\sin 2x}{1-\cos 2x}$

A. $\cot x$
B. $\tan x$
C. $2\cot x$
D. $2\tan x$

GC

~~29.~~ Solve: $2 - x = \sin^2 x$

A. 1.06
B. 1.16
C. 2.43
D. 1.08, 1.68, 2.42

30. Prove the identity:

$$\csc^2 x + \sec^2 x \quad = \quad \csc^2 x \sec^2 x$$

JUN 2000

GC

~~31.~~ Solve: $\tan\theta - \cos^2\theta = \frac{1}{2}\ ,\ 0 \leq \theta < 2\pi$

A. 0.36, 3.50
B. 0.79, 3.93
C. 0.86, 2.74
D. 0.88, 2.94, 3.26, 3.74

32. Simplify $\sin A \cos B + \cos A \sin B$ if $A = \frac{\pi}{2} - B$.

A. -1
B. 0
C. 1
D. $\frac{\pi}{2}$

33. Determine the number of solutions for:

$$\csc\theta(2\sec\theta + 1) = 0\ ,\ 0 \leq \theta < 2\pi$$

A. 0
B. 2
C. 3
D. 4

34. Prove the identity:

$$\frac{1}{\sec\theta + \tan\theta} = \frac{1-\sin\theta}{\cos\theta}$$

JAN 2001

35. Which expression is equivalent to $\frac{\cot\theta\sin\theta}{\sec\theta}$?

A. $\sin^2\theta$
B. $\cos^2\theta$
C. $\sec^2\theta$
D. $\csc^2\theta$

GC

~~36~~. Solve: $3\tan\left(\frac{1}{2}x-2\right) = 4\sin 2x,\ 0 \le x < 2\pi$

A. 1.48, 5.28, 5.94
B. 1.64, 3.56, 3.84
C. 2.20, 2.90, 4.60
D. 3.28, 4.90, 5.74

37. Which of the following is equivalent to $\cos(2\theta+\pi)$?

A. $2\sin\theta\cos\theta$
B. $-2\sin\theta\cos\theta$
C. $1-2\sin^2\theta$
D. $2\sin^2\theta-1$

38. Determine the amplitude of the function $y = k\sin\theta\cos\theta$, where k is a positive constant.

A. $\frac{k}{2}$
B. k
C. $2k$
D. $4k$

39. Prove the identity:

$$\frac{\cot\theta-1}{1-\tan\theta} = \frac{\csc\theta}{\sec\theta}$$

JUN 2001

40. Simplify: $\frac{2\cos\theta}{\sin 2\theta}$

A. $\sin\theta$
B. $\cot\theta$
C. $\sec\theta$
D. $\csc\theta$

G.C

~~41~~. Solve: $\sec\theta + \cot\theta = 2,\quad 0 \le \theta < 2\pi$

A. 0.64
B. 0.93
C. 3.46, 5.13
D. 4.29, 5.97

42. State all restrictions for $\frac{\csc\theta - 1}{\csc\theta + 1}$.

A. $\sin\theta \neq 0$
B. $\sin\theta \neq -1$
C. $\sin\theta \neq 0$, $\sin\theta \neq -1$
D. $\sin\theta \neq 0$, $\sin\theta \neq \pm 1$

43. Prove:

$$\frac{\sin\theta\cos\theta}{1+\cos\theta} = \frac{1-\cos\theta}{\tan\theta}$$

SPECS 2001

44. Prove algebraically the following identity: $\frac{\sin 2x}{1-\cos 2x} = \cot x$

SAMPLE 2001

G.C ~~45~~. Solve: $\tan x + \sin x = 1$, $0 \leq x < 2\pi$

A. 0.49, 4.22
B. 2.06, 5.80
C. 0.49, 1.57, 4.22, 4.71
D. 1.57, 2.06, 4.71, 5.80

46. Which expression is equivalent to $\frac{\cos 8x + 1}{2}$?

A. $\cos^2 4x$
B. $\sin^2 4x$
C. $\cos^2 16x$
D. $\sin^2 16x$

47. Determine the general solution: $3\sin 5x = 1$

A. $x = 0.07 + \frac{2n\pi}{5}$, $x = 0.56 + \frac{2n\pi}{5}$

B. $x = 0.07 + \frac{2n\pi}{5}$, $x = 5.94 + \frac{2n\pi}{5}$

C. $x = 0.07 + 2n\pi$, $x = 0.56 + 2n\pi$

D. $x = 0.07 + 2n\pi$, $x = 5.94 + 2n\pi$

48. Prove the identity:

$$\frac{\cot\theta}{\sin\theta - \csc\theta} = -\sec\theta$$

JAN 2002

49. Simplify: $\dfrac{\sin 2\theta}{\sin\theta}$

A. 2
B. $\sin\theta$
C. $\cos\theta$
D. $2\cos\theta$

50. Which expression is equivalent to $\dfrac{\cos x + \cot x}{\sin x + 1}$?

A. $\sec x$
B. $\csc x$
C. $\cot x$
D. $\tan x$

G.C

~~51~~. Solve: $\sin 3x + \tan x = 3,\ 0 \le x < 2\pi$

A. 1.31, 4.34
B. 2.44, 3.85
C. 1.31, 1.57, 4.34, 4.71
D. 0, 2.44, 3.14, 3.85

52. Which expression is equivalent to $\sin\left(x + \frac{\pi}{3}\right) + \sin\left(x - \frac{\pi}{3}\right)$?

A. $\frac{\sqrt{3}}{4}\sin x$

B. $\sin x$

C. $\sqrt{3}\sin x$

D. $2\sin x$

53. Solve $2\cos^2 x + \cos x - 1 = 0$ algebraically over the set of real numbers. (Give the general solution using exact values.)

APR 2002

G.C

~~54~~. Solve: $\cos x = 2x,\quad 0 \le x < 2\pi$

A. 0.45
B. 0.58
C. 0.90
D. no solution

55. The expression $\cos 3x \cos 2x - \sin 3x \sin 2x$ is equal to

A. $\sin x$
B. $\sin 5x$
C. $\cos x$
D. $\cos 5x$

56. Solve: $2\cos^2 x - 1 = 0,\quad 0 \le x < 2\pi$

A. $\frac{\pi}{4}, \frac{7\pi}{4}$

B. $\frac{\pi}{3}, \frac{5\pi}{3}$

C. $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

D. $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

57. Simplify: $\dfrac{\cos\theta}{\cot\theta} + \dfrac{1}{\csc\theta}$

A. $\csc\theta$
B. $2\sin\theta$
C. $2\cot\theta$
D. $\sin\theta + \cos\theta$

58. Prove:

$$\frac{\sin 2x}{1+\cos 2x} = \frac{\sec^2 x - 1}{\tan x}$$

JUN 2002

59. Determine an expression equivalent to $\sec\theta\cot\theta\sin\theta$.

A. 1
B. $\cot\theta$
C. $\csc\theta$
D. $\tan\theta$

61. Simplify: $\sin(2x+\pi)$

A. $\sin 2x$
B. $\cos 2x$
C. $-\sin 2x$
D. $-\cos 2x$

GC

~~60~~ Solve: $\sin 2x + \cos 3x = 1.5$, $0 \le x < 2\pi$

A. 3.84, 4.37
B. 4.97, 5.12
C. 5.07, 5.58
D. 1.20, 1.90, 3.76, 5.64

62. The two smallest positive solutions of $\sin 3x = 0.4$ are $x = 0.14$ and $x = 0.91$. Determine the general solution of $\sin 3x = 0.4$.

A. $x = 0.14 + 2n\pi$, $x = 0.91 + 2n\pi$, (n is an integer)

B. $x = 0.14 + 6n\pi$, $x = 0.91 + 6n\pi$, (n is an integer)

C. $x = 0.14 + \frac{n\pi}{3}$, $x = 0.91 + \frac{n\pi}{3}$, ($n$ is an integer)

D. $x = 0.14 + \frac{2n\pi}{3}$, $x = 0.91 + \frac{2n\pi}{3}$, ($n$ is an integer)

63. Prove the identity: $\sin 2x(\tan x + \cot x) = 2$

AUG 2002

64. Simplify: $\frac{\csc^2 x - 1}{\csc^2 x}$

A. $\cos^2 x$
B. $\sin^2 x$
C. $-\cos^2 x$
D. $-\sin^2 x$

GC

~~65~~ Solve: $3\cos 2x = -x$, $0 \le x < 2\pi$

A. 0.67
B. 0.52, 1.57
C. 0.67, 3.07
D. 0.95, 1.99

66. Determine the number of solutions for
$(a\sin x + a)(b\cos x - c) = 0$ for $0 \le x < 2\pi$,
if $1 < a < b < c$.

A. 1
B. 2
C. 3
D. 4

JAN 2003

G.C ~~67.~~ Solve: $\sin 2x - \cos x = 1$, $0 \le x < 2\pi$

A. 0, 5.07
B. 3.14, 4.32
C. 3.14, 4.36
D. 0.42, 1.89, 2.95, 4.21

68. Simplify: $\cos(\pi - 2x)$

A. $-\cos 2x$
B. $-\sin 2x$
C. $\cos 2x$
D. $\sin 2x$

69. Determine a cosine equation that has the following general solution: $\frac{\pi}{2} + n\pi$, $\frac{\pi}{6} + 2n\pi$, $\frac{11\pi}{6} + 2n\pi$, where n is an integer.

A. $\cos x\left(2\cos x + \sqrt{2}\right) = 0$
B. $\cos x\left(2\cos x + \sqrt{3}\right) = 0$
C. $\cos x\left(2\cos x - \sqrt{2}\right) = 0$
D. $\cos x\left(2\cos x - \sqrt{3}\right) = 0$

70. Solve the following equation algebraically.

$$3\cos^2 x + \cos x - 2 = 0, \quad 0 \le x < 2\pi$$

71. Prove the identity:

$$(\csc\theta - \sin\theta)\tan\theta = \frac{\sin 2\theta}{2\sin\theta}$$

A.C

72. Solve: $\tan x - \cos x = -2$, $0 \le x < 2\pi$

A. 1.17, 4.10
B. 1.97, 5.32
C. 1.17, 1.57, 4.10, 4.71
D. 1.57, 1.97, 4.71, 5.32

73. Solve: $4\cos^2 x = 3$, $0 \le x < 2\pi$

A. $\frac{\pi}{6}, \frac{11\pi}{6}$

B. $\frac{\pi}{3}, \frac{5\pi}{3}$

C. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

D. $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

74. Determine an expression equivalent to $\tan\theta + \cot\theta$.

A. 1
B. $\sin\theta\cos\theta$
C. $\sec\theta\csc\theta$
D. $\sin\theta + \cos\theta$

75. Which expression is equivalent to $6\sin 8x \cos 8x$?

A. $\sin 8x$
B. $\sin 16x$
C. $3\sin 4x$
D. $3\sin 16x$

76. a) Solve algebraically, giving exact values for x, where $0 \le x < 2\pi$.

$$2\sin^2 x - \sin x = 0$$

b) Give the general solution for this equation.
(Solve over the set of real numbers, giving exact value solutions.)

77. Prove:

$$\frac{\cot\theta}{\sin\theta - \csc\theta} = -\sec\theta$$

JAN 2004

G.C ~~78~~. Solve: $2\sin x = \cos 3x$, where $0 \le x < 2\pi$

A. 0.31, 3.45
B. 2.83, 5.98
C. 0.39, 2.75, 4.03, 5.30
D. 0.98, 2.16, 3.55, 5.89

79. Simplify: $4\cos^2 6x - 2$

A. $2\cos 3x$
B. $4\cos 3x$
C. $2\cos 12x$
D. $4\cos 12x$

80. The smallest positive solution of $\tan bx = 2$ is $x = 0.3$. Determine the general solution of $\tan bx = 2$.

A. $0.3 + 2n\pi$, n is an integer

B. $0.3 + 2bn\pi$, n is an integer

C. $0.3 + \frac{n\pi}{b}$, n is an integer

D. $0.3 + \frac{2n\pi}{b}$, n is an integer

81. Solve algebraically, giving exact values, where $0 \le x < 2\pi$.

$$2\tan x \sin x - \tan x = 0$$

JUN 2004

82. Determine an expression equivalent to $\tan^2\theta \csc\theta + \frac{1}{\sin\theta}$.

A. $\sec^3\theta$
B. $\csc^3\theta$
C. $\csc^2\theta \sec\theta$
D. $\sec^2\theta \csc\theta$

83. Solve over the set of real numbers: $2\sin^2 x - 5\sin x - 3 = 0$

A. $\frac{\pi}{6} + n\pi$, $\frac{5\pi}{6} + n\pi$, n is an integer

B. $\frac{7\pi}{6} + n\pi$, $\frac{11\pi}{6} + n\pi$, n is an integer

C. $\frac{\pi}{6} + 2n\pi$, $\frac{5\pi}{6} + 2n\pi$, n is an integer

D. $\frac{7\pi}{6} + 2n\pi$, $\frac{11\pi}{6} + 2n\pi$, n is an integer

84. Prove the identity:

$$\csc\theta\sin 2\theta - \sec\theta\cos 2\theta = \sec\theta$$

AUG 2005

6.C ~~85~~. Solve: $\sin^2 x = 3 - x$

A. 2.18
B. 2.97
C. 3.02
D. 3.09

$$2\cos^2 x + 3\cos x + 1 = 0$$

86. Solve the equation algebraically, giving exact values for x, where $0 \le x < 2\pi$.

87. Give the general solution for this equation.
(Solve over the set of real numbers giving exact value solutions.)

88. Prove the identity.

$$\cos 2x = \frac{\cot x - \sin 2x}{\cot x}$$

AUG 2006

89. Determine an equivalent expression to $\sin(2x - \pi)$.

A. $2\sin x\cos x$
B. $-2\sin x\cos x$
C. $\cos^2 x - \sin^2 x$
D. $\sin^2 x - \cos^2 x$

90. Determine the number of solutions for $(a\sin x - b)(a\cos x - a)(b\sin x + a) = 0$ where $0 \le x < 2\pi$, if $0 < a < b$.

A. 3
B. 4
C. 5
D. 6

91. Determine the general solution algebraically. (Solve over the set of real numbers.)

$$3\cos^2 x - 8\cos x + 4 = 0$$

(Answer accurate to at least 2 decimal places.)

92. Prove the identity:

$$\frac{\tan x(\cos x + \cot x)}{\sec x + \tan x} = \frac{\sin x \sin 2x}{2 - 2\cos^2 x}$$

SAMPLE 2008

93. Which expression is equivalent to $\sin(\pi + 2x)$?

A. $2\cos^2 x - 1$

B. $1 - 2\cos^2 x$

C. $2\sin x \cos x$

D. $-2\sin x \cos x$

94. Solve $\sqrt{3}\cos x \tan x + \cos x = 0$, where $0 \le x < 2\pi$.

A. $\frac{\pi}{6}, \frac{7\pi}{6}$

B. $\frac{5\pi}{6}, \frac{11\pi}{6}$

C. $\frac{\pi}{6}, \frac{7\pi}{6}, \frac{\pi}{2}, \frac{3\pi}{2}$

D. $\frac{5\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}, \frac{3\pi}{2}$

95. Solve $\cos 2x - 3\sin x = 2$, where $-\pi \le x \le \pi$

A. $\frac{7\pi}{6}, \frac{11\pi}{6}, \frac{3\pi}{2}$

B. $\frac{4\pi}{3}, \frac{5\pi}{3}, \frac{3\pi}{2}$

C. $-\frac{\pi}{6}, -\frac{5\pi}{6}, -\frac{\pi}{2}$

D. $-\frac{\pi}{3}, -\frac{2\pi}{3}, -\frac{\pi}{2}$

~~96~~. Solve $2\cos x = 2^x$, where $-\pi \le x \le \pi$.

G.C

A. $-1.45, 0.57$

B. $-1.38, 0.66$

C. $-1.38, 0, 0.66$

D. $-1.11, 1.72, 2.93$

97. Determine the restrictions for $\frac{3 + 2\csc\theta}{2\sec\theta - 3}$.

A. $\sin\theta \ne 0, \cos\theta \ne 0$

B. $\cos\theta \ne \frac{2}{3}, \cos\theta \ne 0$

C. $\cos\theta \ne \frac{2}{3}, \sin\theta \ne 0, \cos\theta \ne 0$

D. $\sin\theta \ne -\frac{2}{3}, \cos\theta \ne \frac{2}{3}, \sin\theta \ne 0, \cos\theta \ne 0$

98. The two smallest positive solutions of $\cos 4x = 0.6$ are $x = 0.23$ and $x = 1.34$. Determine the general solution for $\cos 4x = 0.6$.

99. Prove the identity:

$$\frac{\tan x}{\sec x + 1} = \frac{2\cos x - 2\cos^2 x}{\sin 2x}$$

JAN 2008

100. Determine an equivalent expression for $\sin 3x \cos x + \cos 3x \sin x$.

A. $4\sin x$

B. $2\sin x \cos x$

C. $4\sin x \cos x$

D. $2\sin 2x \cos 2x$

101. Solve: $4\cos^2 x = 3, \quad 0 \le x < 2\pi$

A. $\frac{\pi}{6}, \frac{11\pi}{6}$

B. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

C. $\frac{\pi}{3}, \frac{5\pi}{3}$

D. $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

102. Solve: $5\sin^2 x = \cos x, \quad 0 \le x < 2\pi$

A. 0.43, 1.78

B. 0.44, 5.84

C. 0.82, 1.73

D. 2.87, 3.58

103. Determine the restriction(s) for the expression $\frac{\sec x}{2\sin x + 1}$.

A. $\sin x \ne -\frac{1}{2}$

B. $\sin x \ne 0, \quad \sin x \ne -\frac{1}{2}$

C. $\cos x \ne 0, \quad \sin x \ne -\frac{1}{2}$

D. $\cos x \ne 0, \quad \sin x \ne 0, \quad \sin x \ne -\frac{1}{2}$

104. Solve algebraically, giving exact answers for x, where $0 \le x < 2\pi$. $2\sin^2 x + \sqrt{3}\sin x = 0$

105. The smallest positive solution of $\tan 3x = 0.6$ is $x = 0.18$. Determine the general solution for $\tan 3x = 0.6$.

106. Prove the identity: $\dfrac{\sin\theta}{1-\sin\theta} + \dfrac{\sin\theta}{1+\sin\theta} = \sin 2\theta \sec^3\theta$

ADDITIONAL QUESTIONS

107. Express $\sin x \cos x$ in terms of a single trigonometric function.

A. $\dfrac{\sin 2x}{2}$ B. $\dfrac{\cos^2 x}{2}$ C. $2\sin 2x$ D. $2\cos^2 x$

108. What is the period of the graph of $y = 2\cos^2 5x - 1$?

A. $\dfrac{\pi}{5}$ B. $\dfrac{2\pi}{5}$ C. π D. 2π

109. Which expression is equivalent to $\left(\sin^2\theta - \cos^2\theta\right)^2 - \sin^2 2\theta$?

A. $-2\sin^2 2\theta$ B. $2\sin^2 2\theta$ C. $-\cos 4\theta$ D. $\cos 4\theta$

110. Determine the amplitude of the graph of the function $y = 6\sin x \cos x$.

A. 2 B. 3 C. 6 D. 12

111. Simplify: $\cos^4\theta - \sin^4\theta$

A. -1 B. $-\cos 2\theta$ C. $\cos 2\theta$ D. $\cos 4\theta$

112. Determine a single geometric mean between $\sec x - 1$ and $\sec x + 1$.

A. -1 B. 1 C. $\cos x$ D. $\tan x$

2009 SAMPLE QUESTIONS

113. Solve: $2\cos^2 x - \cos x - 1 = 0$, $0 \le x < 2\pi$

A. $x = 0, \frac{5\pi}{6}, \frac{7\pi}{6}$

B. $x = 0, \frac{2\pi}{3}, \frac{4\pi}{3}$

C. $x = \frac{x}{6}, \pi, \frac{11\pi}{6}$

D. $x = \frac{\pi}{3}, \pi, \frac{5\pi}{3}$

G.C

~~114~~. Solve: $2\sin x = \cos 3x$, where $0 \le x < 2\pi$

A. 0.31, 3.45

B. 2.83, 5.98

C. 0.39, 2.75, 4.03, 5.30

D. 0.98, 2.16, 3.55, 5.89

115. Determine the number of solutions in the interval $0 \le x < 2\pi$ for:

$$\sin ax = \frac{1}{3}, \quad a \text{ is an integer, where } a \ge 1$$

A. 2

B. $\frac{a}{2}$

C. a

D. $2a$

116. Solve: $\sin 2x = \frac{1}{\sqrt{2}}$, where $0 \le x < 2\pi$

A. $x = \frac{\pi}{8}, \frac{3\pi}{8}$

B. $x = \frac{\pi}{8}, \frac{3\pi}{8}, \frac{9\pi}{8}, \frac{11\pi}{8}$

C. $x = \frac{\pi}{4}, \frac{3\pi}{4}$

D. $x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

117. Solve algebraically, giving exact values, where $0 \le x < 2\pi$.

$$\sin x = \cos 2x$$

118. Solve algebraically, giving exact values, where $-\frac{\pi}{2} < x < \frac{\pi}{2}$:

$$2\tan x \cos x - \sqrt{3}\tan x = 0$$

119. Solve algebraically, giving exact values: $\sin \frac{1}{3}x = \frac{\sqrt{3}}{2}$

a) where $0 \le x < 2\pi$
b) over the set of real numbers

120. Determine the general solution: $\sin 2x = -\frac{1}{2}$

A. $\frac{7\pi}{12} + 2n\pi$, $\frac{11\pi}{12} + 2n\pi$, n is an integer

B. $\frac{7\pi}{12} + n\pi$, $\frac{11\pi}{12} + n\pi$, n is an integer

C. $\frac{13\pi}{12} + 2n\pi$, $\frac{21\pi}{12} + 2n\pi$, n is an integer

D. $\frac{13\pi}{12} + n\pi$, $\frac{21\pi}{12} + n\pi$, n is an integer

121. Solve $\cos^2 x = \cos x$ over the set of real numbers. (Give exact value solutions.)

122. The two smallest positive solutions of $\sin 3x = 0.7$ are $x = 0.26$ and $x = 0.79$.
Determine the general solution for $\sin 3x = 0.7$.

123. Solve algebraically $6\sin^2 x - \sin x - 2 = 0$ over the set of real numbers.
(Give exact value solutions where possible, otherwise answer accurate to two decimal places.)

124. Solve algebraically $\sin 2x - 2\cos^2 x = 0$ over the set of real numbers.
(Give exact value solutions.)

125. Determine the restriction(s) for the expression $\frac{\tan\theta}{2\cos\theta - 1}$.

A. $\cos\theta \neq \frac{1}{2}s$

B. $\sin\theta \neq 0$

C. $\sin\theta \neq 0$, $\cos\theta \neq \frac{1}{2}$

D. $\cos\theta \neq 0$, $\cos\theta \neq \frac{1}{2}$

126. Determine an expression equivalent to $\tan^2\theta\csc\theta + \frac{1}{\sin\theta}$.

A. $\sec^3\theta$ B. $\csc^3\theta$ C. $\csc^2\theta\sec\theta$ D. $\sec^2\theta\csc\theta$

127. Determine an expression equivalent to $\frac{\tan\theta\csc^2\theta}{\sec^2\theta}$.

A. $\tan\theta$ B. $\cot\theta$ C. $\tan^2\theta$ D. $\tan^3\theta$

128. Prove the identity: $\frac{\cos x + \cot x}{\sec x + \tan x} = \cos x \cot x$

129. Prove the identity: $\frac{2\cos x + 2\cos^2 x}{\sin 2x} = \frac{\sin x}{1 - \cos x}$

130. Determine an expression equivalent to $\cos(\pi + 2A)$.

A. $-\cos 2A$ B. $\cos 2A$ C. $-\sin 2A$ D. $\sin 2A$

131. Simplify: $\cos 2x \cos x + \sin 2x \sin x$

A. $\cos x$ B. $\sin x$ C. $\cos 3x$ D. $\sin 3x$

132. Simplify: $\dfrac{2\sin\theta}{\sin 2\theta}$

A. 1 B. $\cos\theta$ C. $\csc\theta$ D. $\sec\theta$

133. Prove the identity: $\dfrac{\tan x + \sin x}{1 + \cos x} = \dfrac{1}{\csc 2x} - \dfrac{\tan x}{\sec 2x}$

TRIGONOMETRY II

1 A
2 A
3 B
4 1.91, 4.37
5 B
6 B
7 C
8 D
9 B
10 B
11 B
12
13 D
14 D
15 B
16
17 D
18 B
19 A
20
21 D
22 D
23 C
24
25 A
26 D
27 C
28 A
29 B
30
31 B
32 C
33 A
34
35 B
36 C
37 D
38 A
39
40 D
41 C
42 C
43
44
45 A
46 A
47 A
48
49 D
50 C
51 A
52 B
53 $\frac{\pi}{3}+2n\pi, \frac{5\pi}{3}+2n\pi,$
$\pi+2n\pi, \quad n\in I$
54 A
55 D
56 C
57 B
58
59 A
60 A
61 C
62 D
63
64 A
65 D
66 A
67 C
68 A
69 D
70 0.84, 3.14, 5.44
71
72 B
73 C
74 C
75 D
76 a) $0, \frac{\pi}{6}, \pi, \frac{5\pi}{6}$
b) $\frac{\pi}{6}+2n\pi, \frac{5\pi}{6}+2n\pi,$
$n\pi, \quad n\in I$
77
78 A
79 C
80 C
81 $0, \frac{\pi}{6}, \pi, \frac{5\pi}{6}$
82 D
83 D
84
85 B
86 $\frac{2\pi}{3}, \frac{4\pi}{3}, \pi$
87 $\frac{2\pi}{3}+2n\pi, \frac{4\pi}{3}+2n\pi,$
$\pi+2n\pi, \quad n\in I$
88
89 B
90 A
91 $0.84+2n\pi,$
$5.44+2n\pi, n\in I$
92
93 D
94 B
95 C
96 B
97 C
98 $0.23+\frac{n\pi}{2}, 1.34+\frac{n\pi}{2}, n\in I$
99
100 D
101 B
102 B
103 C
104 $0, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}$
105 $0.18+\frac{n\pi}{3}, n\in I$
106
107 A
108 A
109 D
110 B
111 C
112 A
113 B
114 A
115 D
116 B
117 $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$
118 $-\frac{\pi}{6}, 0, \frac{\pi}{6}$
119 a) π
b) $\pi+6n\pi, 2\pi+6n\pi, \ n\in I$
120 B
121 $\frac{\pi}{2}+2n\pi, \frac{3\pi}{2}+2n\pi,$
$2n\pi, \quad n\in I$
122 $0.26+\frac{2n\pi}{3}, 0.79+\frac{2n\pi}{3}, n\in I$
123 $0.73+2n\pi, \ 2.41+2n\pi,$
$\frac{7\pi}{6}+2n\pi, \ \frac{11\pi}{6}+2n\pi, n\in I$
124 $\frac{\pi}{2}+2n\pi, \ \frac{3\pi}{2}+2n\pi$
$\frac{\pi}{4}+2n\pi, \ \frac{5\pi}{4}+2n\pi, n\in I$
125 D
126 D
127 B
128
129
130 A
131 A
132 D
133