

GO COUGARS!

Homework Questions

$$11. \tan \theta = 2, \sin \theta < 0$$

$$12. \sec \theta = -3, \tan \theta > 0$$

~~13. sec x is undefined.~~

~~14. tan x undefined.~~

~~15. sin x undefined.~~

~~16. cos x undefined.~~

~~17. csc x undefined.~~

~~18. cot x undefined.~~

In Exercises 15–20, match the trigonometric expression with one of the following.

(a) sec x (b) \tan^{-1} (c) $\cot x$

(d) $\sec^{-1} x$ (e) $-\tan x$ (f) $\sin x$

15. $\sec x \cos x$ 16. $\tan x \sec x$

17. $\cot^2 x - \csc^2 x$ 18. $(1 - \cos^2 x)(\csc x)$

In Exercises 21–26, match the trigonometric expression with one of the following.

(a) sec x (b) $\tan x$ (c) $\sin^2 x$

(d) $\sin x \tan x$ (e) $\sec^2 x$ (f) $\sec^2 x + \tan^2 x$

21. $\sin x \sec x$ 22. $\cos^2 x(\sec^2 x - 1)$

23. $\sec^2 x - \tan^2 x$ 24. $\cot x$

25. $\frac{\sec^2 x - 1}{\sin^2 x}$ 26. $\frac{\cos^2(x/2) - x}{\cos x}$

In Exercises 27–38, use the fundamental identities to simplify the expression. Use the table feature of a graphing utility to check your result numerically.

27. $\cot x \sin x$ 28. $\cos \beta \tan \beta$

29. $\sec(\phi - \theta) - \sin \phi$ 30. $\sec^2 x(1 - \sin^2 x)$

31. $\csc x$ 32. $\frac{\sec x}{\csc \theta}$

33. $\cot x \cdot \frac{\sin \theta}{\tan \theta}$ 34. $\frac{\tan^2 \theta}{\sec^2 \theta}$

35. $\sec x \cdot \frac{\sin \theta}{\tan \theta}$ 36. $\frac{\tan^2 \theta}{\sec^2 \theta}$

In Exercises 51–60, factor the expression and use the fundamental identities to simplify. Use a graphing utility to check your results graphically.

51. $\frac{\cot x \cdot \tan x}{\cot x + \tan x}$ 52. $\sec^2 x \tan^2 x + \sec^2 x$

53. $\cos x - \sin x$ 54. $\frac{\cos x - 1}{\cos x + 1}$

55. $\tan^2 x + 2 \tan x + 1$ 56. $1 - 2 \tan^2 x + \sin^2 x$

57. $\sin^2 x - \cos^2 x$

58. $\sec^2 x - \tan^2 x$

59. $\frac{\sec^2 x - \tan^2 x}{\sec x + \tan x}$

60. $\sec x - \sec x \cdot \tan x + 1$

In Exercises 61–68, perform the indicated operations and use the fundamental identities to simplify.

61. $(\sin x + \cos^2 x)^2$

62. $(\tan x + \sec x)(x - \sec x)$

63. $(\sec x + 1)(\csc x - 1)$

64. $(5 - 5 \sin x)(5 + 5 \sin x)$

65. $\frac{1}{1 + \cos x} + \frac{1}{1 - \cos x}$

66. $\frac{1}{\sec x + 1} - \frac{1}{\sec x - 1}$

67. $\frac{\sec^2 x}{\tan x}$

68. $\frac{\tan^2 x - \sec^2 x}{\tan x}$

69. $\frac{-1}{\tan x}$

70. $-\cot x$

71. $\frac{\tan^2 x}{\sec^2 x}$

72. $\frac{\sec x}{\tan x}$

73. $\frac{\cot x}{\sec x}$

74. $\frac{\sec x}{\tan x}$

75. $\frac{\tan x}{\sec x}$

76. $\frac{\sec x}{\tan x}$

77. $\frac{\cot x}{\sec x}$

78. $\frac{\sec x}{\tan x}$

79. $\frac{\tan x}{\sec x}$

80. $\frac{\cot x}{\sec x}$

81. $\frac{\sec x}{\tan x}$

82. $\frac{\tan x}{\sec x}$

83. $\frac{\cot x}{\sec x}$

84. $\frac{\sec x}{\tan x}$

85. $\frac{\tan x}{\sec x}$

86. $\frac{\cot x}{\sec x}$

87. $\frac{\sec x}{\tan x}$

88. $\frac{\tan x}{\sec x}$

89. $\frac{\cot x}{\sec x}$

90. $\frac{\sec x}{\tan x}$

91. $\frac{\tan x}{\sec x}$

92. $\frac{\cot x}{\sec x}$

93. $\frac{\sec x}{\tan x}$

94. $\frac{\tan x}{\sec x}$

95. $\frac{\cot x}{\sec x}$

96. $\frac{\sec x}{\tan x}$

97. $\frac{\tan x}{\sec x}$

98. $\frac{\cot x}{\sec x}$

99. $\frac{\sec x}{\tan x}$

100. $\frac{\tan x}{\sec x}$

101. $\frac{\cot x}{\sec x}$

102. $\frac{\sec x}{\tan x}$

103. $\frac{\tan x}{\sec x}$

104. $\frac{\cot x}{\sec x}$

105. $\frac{\sec x}{\tan x}$

106. $\frac{\tan x}{\sec x}$

107. $\frac{\cot x}{\sec x}$

108. $\frac{\sec x}{\tan x}$

109. $\frac{\tan x}{\sec x}$

110. $\frac{\cot x}{\sec x}$

111. $\frac{\sec x}{\tan x}$

112. $\frac{\tan x}{\sec x}$

113. $\frac{\cot x}{\sec x}$

114. $\frac{\sec x}{\tan x}$

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116. $\frac{\cot x}{\sec x}$

117. $\frac{\sec x}{\tan x}$

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133. $\frac{\tan x}{\sec x}$

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224. $\frac{\cot x}{\sec x}$

225. $\frac{\sec x}{\tan x}$

226. $\frac{\tan x}{\sec x}$

227. $\frac{\cot x}{\sec x}$

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236. $\frac{\cot x}{\sec x}$

237. $\frac{\sec x}{\tan x}$

238. $\frac{\tan x}{\sec x}$

239. $\frac{\cot x}{\sec x}$

240. $\frac{\sec x}{\tan x}$

241. $\frac{\tan x}{\sec x}$

242. $\frac{\cot x}{\sec x}$

243. $\frac{\sec x}{\tan x}$

244

Feb 2-9:51 PM

5.2 Verifying Trig Identities

To make one side of the equation to look like the other.

To Verify a Trig Identity you may work with one side of the equation only!!

Rules/Suggestions/Look For

1. $\sec y \cos y = 1$

$$\text{LHS } \frac{1}{\cos y} \cdot \cancel{\cos y} \\ 1 = 1 \quad \checkmark$$

reciprocals

2. $\frac{\sin^2 x}{\tan^2 x} = \cos^2 x$

$$\text{LHS } \cancel{\sin^2 x} \cdot \cancel{\cot^2 x} \\ \cancel{\sin^2 x} \cdot \cancel{\cos^2 x} \\ \cos^2 x = \cos^2 x \quad \checkmark$$

reciprocal
quotient identity

3. $\cos^2 x - \sin^2 x = 2\cos^2 x - 1$

$$\text{LHS } \cos^2 x - (1 - \cos^2 x) \\ \cos^2 x - 1 + \cos^2 x \\ 2\cos^2 x - 1 = 2\cos^2 x - 1 \quad \checkmark$$

Pythagorean Identity

$$\sin^2 x + \cos^2 x = 1 \\ \sin^2 x = 1 - \cos^2 x$$

Feb 16-1:07 PM

4. $(\sec \theta - \tan \theta)(\csc \theta + 1) = \cot \theta$

$$\text{LHS } \left(\frac{1}{\cos \theta} - \frac{\sin \theta}{\cos \theta} \right) \left(\frac{1}{\sin \theta} + 1 \right)$$

$$\rightarrow \left(\frac{1 - \sin \theta}{\cos \theta} \right) \left(\frac{1 + \sin \theta}{\sin \theta} \right)$$

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

in terms sin/cos

common denom

foiled

P.I

cancel

$$\frac{\cos \theta}{\cos \theta + \sin \theta}$$

$$\cdot \frac{\cos \theta}{\sin \theta}$$

$$\cot \theta = \cot \theta \quad \checkmark$$

rewrite

Feb 21-6:28 AM

$$5. \frac{1+\cos\theta}{\sin\theta} + \frac{\sin\theta}{1+\cos\theta} = 2\csc\theta$$

LHS $\frac{(1+\cos\theta)(1+\cos\theta) + \sin\theta(\sin\theta)}{\sin\theta(1+\cos\theta)}$

$$\frac{1+2\cos\theta+\cos^2\theta + \sin^2\theta}{\sin\theta(1+\cos\theta)}$$

common denom

$$\frac{2+2\cos\theta}{\sin\theta(1+\cos\theta)}$$

foil

$$\frac{2(1+\cos\theta)}{\sin\theta(1+\cos\theta)}$$

identity

$$\frac{2}{\sin\theta}$$

factor

$$2\csc\theta$$

cancel

reciprocal

$$= 2\csc\theta$$



Feb 21-6:20 AM

$$6. \frac{\sin\beta}{1-\cos\beta} = \frac{1+\cos\beta}{\sin\beta}$$

mult by conjugate
of denominator

$$\frac{1+\cos\beta}{1+\cos\beta} \cdot \frac{\sin\beta}{1-\cos\beta}$$

foil

$$\frac{(1+\cos\beta)\sin\beta}{1-\cos^2\beta}$$

P. I

$$\frac{(1+\cos\beta)\sin\beta}{\sin^2\beta}$$

cancel

$$\frac{1+\cos\beta}{\sin\beta}$$

Feb 21-6:21 AM

HOMEWORK



p 365

1-9 odd, 39-45 odd, 48

Feb 2-9:51 PM