MAC 1114 – Spring 2018 – EXAM 3

Section # _____ Name _____

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Questions 1 and 2 refer to the following scenario: A 10-foot long ladder is leaning against a house so that the bottom of the ladder is 2 feet away from the house.

1. How high is the top of the ladder?

   A. $2\sqrt{26}$ feet

   B. 104 feet

   C. 96 feet

   D. $4\sqrt{6}$ feet

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2. Which of the following is the angle of elevation of the ladder?

   A. $\arctan\left(\frac{1}{2\sqrt{6}}\right)$

   B. $\arcsin\left(\frac{2\sqrt{6}}{5}\right)$

   C. $\arccos\left(\frac{1}{2\sqrt{6}}\right)$

   D. $\arccos(5)$

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3. Which of the following is NOT a trigonometric identity?

   A. $\sin(-x) = -\sin x$

   B. $\sec^2 x + \csc^2 x = 1$

   C. $1 + \tan^2 x = \sec^2 x$

   D. $\sin^2 x + \cos^2 x = 1$

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4. Factor the expression.

$$8\tan^2 x - 6\sec x + 3$$

   A. $(8\sec x - 5)(8\sec x - 1)$

   B. The expression cannot be factored.

   C. $(\sec x + 4)(\sec x - 10)$

   D. $(4\sec x - 5)(2\sec x + 1)$

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5. Perform the multiplication and use identities to simplify.

$$(4\sin x - 4\cos x)^2$$

A. 4

B. $4 - 8\sin x \cos x$

C. $16 - 32\sin x \cos x$

D. 16

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6. Which of the following expressions is equal to $\dfrac{\sec x}{1-\cos^2 x} \cdot \tan^2 x$?

A. $-\dfrac{1}{\cos^3 x}$

B. $\cos x$

C. $\dfrac{\sec^2 x}{\cos x}$

D. $-\dfrac{\tan^2 x}{\cos x \sin^2 x}$

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7. Suppose the equation $6\tan^2 x - \tan x - 70 = 0$ has two solutions between 0 and π, $x = \theta_1$ and $x = \theta_2$. What is the general solution of the equation?

A. $x = \theta_1, \theta_2$

B. $x = \theta_1 + 2n\pi, \theta_2 + 2n\pi$

C. $x = \theta_1 \pm \pi, \theta_2 \pm \pi$

D. $x = \theta_1 + n\pi, \theta_2 + n\pi$

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8. Find all solutions in the interval $[0, 2\pi)$.

$$2\sin x \cos x - \cos x - 2\sin x + 1 = 0$$

A. $x = 0, \dfrac{\pi}{3}, \dfrac{2\pi}{3}$

B. $x = \dfrac{\pi}{3}, \dfrac{\pi}{2}, \dfrac{2\pi}{3}$

C. $x = 0, \dfrac{\pi}{6}, \dfrac{5\pi}{6}$

D. $x = 2n\pi, \dfrac{\pi}{6} + 2n\pi, \dfrac{5\pi}{6} + 2n\pi$

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9. Find the general solution of $4\cos x - 2\sqrt{3} = 0$.

A. $x = \frac{\pi}{6} + 2n\pi, \frac{5\pi}{6} + 2n\pi, \frac{7\pi}{6} + 2n\pi, \frac{11\pi}{6} + 2n\pi$

B. $x = \frac{\pi}{6} + n\pi, \frac{11\pi}{6} + n\pi$

C. $x = \frac{\pi}{6} + 2n\pi, \frac{11\pi}{6} + 2n\pi$

D. $x = \frac{\pi}{6} + 2n\pi, \frac{5\pi}{6} + 2n\pi$

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10. Find the general solution of $\tan^2 x - 7\tan x + 6 = 0$.

A. $x = \frac{\pi}{4} + n\pi, \frac{3\pi}{4} + n\pi, \arctan(6) + n\pi$

B. $x = \frac{\pi}{4} + n\pi, \arctan(6) + n\pi$

C. $x = \frac{\pi}{4} + 2n\pi, \arctan(6) + 2n\pi$

D. $x = \frac{\pi}{4} + n\pi$

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YOU MUST SHOW ALL WORK TO RECEIVE FULL CREDIT.

1. (5 points) Identify each statement as true or false. (Just write true or false beside each statement.)

   (a) The sum of the measures of the angles in any triangle is $180°$.

   (b) $\dfrac{1}{1+\cot^2 x} = \dfrac{1}{\sec^2 x} = \cos^2 x.$

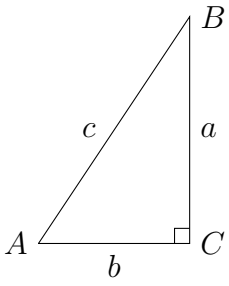
   (c) $(\sin x + \cos x)^2 = \sin^2 x + \cos^2 x = 1.$

   (d) The equation $\sin^2 x - 9 = 0$ has no solution.

   (e) The general solution of $\tan x = 1$ is $x = \dfrac{\pi}{4} + 2n\pi$.

2. (5 points)

   Solve the right triangle shown in the figure for all unknown sides and angles if $b = 6$ and $B = 36°$. Keep your answers exact.



3. (5 points) Use the values $\sin(-x) = \dfrac{1}{\sqrt{10}}$ and $\cot x = 3$ to find the values of all six trigonometric functions. You **must** use trigonometric identities to receive credit (do not sketch a right triangle).

4. (5 points) Find the general solution of $\cos^2(10x) + 3\sin(10x) + 3 = 0$.