PRACTICE 3

Student: ____________________ Date: ____________________	Course: Trigonometry	Test 3 covers Section 5.1, 5.2, 5.3, 5.4, 5.5

1. Choose the expression that completes an identity.

   $\tan^2 x + 1 =$ (1) ____________

   (1) ○ $\csc^2 x$ ○ $\sec^2 x$
   ○ $\cot x$ ○ $\sin^2 x + \cos^2 x$
   ○ $\dfrac{\sin x}{\cos x}$
   ○ $\cos x$

2. For the expression in Column I, choose the expression from Column II that completes an identity.

Column I	Column II
1 = (1) ____________	A. $\sin^2 x + \cos^2 x$ B. $\cos x$ C. $\sec^2 x$ D. $\dfrac{\sin x}{\cos x}$ E. $\cot x$

   (1) ○ $\sin^2 x + \cos^2 x$ ○ $\cot x$
   ○ $\cos x$
   ○ $\sec^2 x$
   ○ $\dfrac{\sin x}{\cos x}$

3. Write the expression in terms of sine and cosine, and then simplify so that no quotients appear in the final expression.

   $$-\cos^2\theta\left(\sec^2\theta - 1\right)$$

   Choose the correct answer below.

   ○ **A.** $\dfrac{1}{\cos^2\theta}$

   ○ **B.** $\sin^2\theta$

   ○ **C.** $-\dfrac{1}{\cos^2\theta}$

   ○ **D.** $-\sin^2\theta$

   ○ **E.** $\cot^2\theta$

   ○ **F.** $\tan^2\theta$

4. Write the expression in terms of sine and cosine, and then simplify the expression so that no quotients appear and all functions are of t only.

   $\sin t(\csc t - \sin t)$

   $\sin t(\csc t - \sin t) =$ ____________

5. Fill in the blanks to complete the fundamental identities.

$$\tan\theta = \frac{1}{\_\_\_\_\_\_} = \frac{\sin\theta}{\_\_\_\_\_\_}$$

6. Perform the indicated operation and simplify the result so that there are no quotients.

$(8 + \sin t)^2 + \cos^2 t$

The simplified form, with no quotients, of $(8 + \sin t)^2 + \cos^2 t$ is __________.
(Do not factor.)

7. Write the following expression as a single trigonometric function or a power of a trigonometric function.

$$\frac{\sec\beta \ \tan\beta}{\csc\beta}$$

Choose the correct answer below.

- $\frac{1}{\tan^2\beta}$
- 1
- $\tan^2\beta$
- $\frac{\sin^2\beta}{\cos^2\beta}$

8. Verify that the trigonometric equation is an identity.

$$\left(1 - \sin^2\alpha\right)\left(1 + \sin^2\alpha\right) = 2\cos^2\alpha - \cos^4\alpha$$

Which of the following statements establishes the identity?

- **A.** $\left(1 - \sin^2\alpha\right)\left(1 + \sin^2\alpha\right) = \cot^2\alpha\left(\csc^2\alpha + 1\right) = \cot^2\alpha\left(\cot^2\alpha + 1 + 1\right)$
$= 2\cos^2\alpha - \cos^4\alpha$
- **B.** $\left(1 - \sin^2\alpha\right)\left(1 + \sin^2\alpha\right) = \sec^2\alpha\left(\tan^2\alpha - 1\right) = \sec^2\alpha\left(\sec^2\alpha - 1 - 1\right)$
$= 2\cos^2\alpha - \cos^4\alpha$
- **C.** $\left(1 - \sin^2\alpha\right)\left(1 + \sin^2\alpha\right) = \csc^2\alpha\left(\cot^2\alpha - 1\right) = \csc^2\alpha\left(\csc^2\alpha - 1 - 1\right)$
$= 2\cos^2\alpha - \cos^4\alpha$
- **D.** $\left(1 - \sin^2\alpha\right)\left(1 + \sin^2\alpha\right) = \cos^2\alpha\left(1 + \sin^2\alpha\right) = \cos^2\alpha\left(1 + 1 - \cos^2\alpha\right)$
$= 2\cos^2\alpha - \cos^4\alpha$

9. Use identities to reduce the expression to a function of α.

$\cos(\alpha + 0^\circ)$

Choose the correct function for $\cos(\alpha + 0^\circ)$.

- **A.** $-\cos \alpha$
- **B.** $\sin \alpha$
- **C.** $-\sin \alpha$
- **D.** $\cos \alpha$

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10. Use the cosine of a sum and cosine of a difference identities to find $\cos(s+t)$ and $\cos(s-t)$.

$\sin s = -\frac{3}{5}$ and $\sin t = \frac{5}{13}$, s in quadrant IV and t in quadrant II

$\cos(s+t) =$ ____________
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$\cos(s-t) =$ ____________
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

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11. Tell whether the statement is true or false.

$\cos 39^\circ = \cos 30^\circ \cos 9^\circ - \sin 30^\circ \sin 9^\circ$

Is the statement true or false?

- False
- True

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12. Establish the identity.

$\cos(2\pi + x) = \cos x$

Choose the sequence of steps below that verifies the identity.

- **A.** $\cos(2\pi + x) = \cos 2\pi \cos x - \sin 2\pi \sin x = (1)\cos x - (0)\sin x = \cos x$
- **B.** $\cos(2\pi + x) = \cos \pi \cos x - \sin \pi \sin x = (1)\cos x - (0)\sin x = \cos x$
- **C.** $\cos(2\pi + x) = \cos \pi \cos x + \sin \pi \sin x = (-1)\cos x + (0)\sin x = \cos x$
- **D.** $\cos(2\pi + x) = \cos 2\pi \cos x + \sin 2\pi \sin x = (1)\cos x + (0)\sin x = \cos x$

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13. Find the expression that is equivalent to $\sin 80^\circ \cos 30^\circ + \cos 80^\circ \sin 30^\circ$.

Choose the correct answer below.

- $\cos 50^\circ$
- $\cos 110^\circ$
- $\sin 110^\circ$
- $\sin 50^\circ$

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14. Find the expression that is equivalent to $\dfrac{\tan\frac{4\pi}{5} - \tan\frac{\pi}{6}}{1 + \tan\frac{4\pi}{5}\tan\frac{\pi}{6}}$.

Choose the correct answer below.

- A. $\tan\frac{19\pi}{30}$
- B. $\tan\frac{4\pi}{5} - \tan\frac{\pi}{6}$
- C. $\tan\frac{29\pi}{30}$
- D. $\tan\frac{2\pi}{15}$

15. Write the expression as a function of x, with no angle measure involved.

$$\sin\left(\frac{\pi}{4} + x\right)$$

$\sin\left(\frac{\pi}{4} + x\right) =$ ____________

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

16. Establish the identity.

$$\frac{\sin(\alpha - \beta)}{\cos\alpha\cos\beta} = \tan\alpha - \tan\beta$$

Choose the sequence of steps below that verifies the identity.

- A. $\dfrac{\sin(\alpha-\beta)}{\cos\alpha\cos\beta} = \dfrac{\sin\alpha\cos\beta - \cos\alpha\sin\beta}{\sin\alpha\sin\beta} = \dfrac{\sin\alpha\cos\beta}{\sin\alpha\sin\beta} - \dfrac{\cos\alpha\sin\beta}{\sin\alpha\sin\beta} = \tan\alpha - \tan\beta$
- B. $\dfrac{\sin(\alpha-\beta)}{\cos\alpha\cos\beta} = \dfrac{\sin\alpha\sin\beta + \cos\alpha\cos\beta}{\cos\alpha\cos\beta} = \dfrac{\sin\alpha\sin\beta}{\cos\alpha\cos\beta} + \dfrac{\cos\alpha\cos\beta}{\cos\alpha\cos\beta} = \tan\alpha - \tan\beta$
- C. $\dfrac{\sin(\alpha-\beta)}{\cos\alpha\cos\beta} = \dfrac{\sin\alpha\cos\beta - \cos\alpha\sin\beta}{\cos\alpha\cos\beta} = \dfrac{\sin\alpha\cos\beta}{\cos\alpha\cos\beta} - \dfrac{\cos\alpha\sin\beta}{\cos\alpha\cos\beta} = \tan\alpha - \tan\beta$
- D. $\dfrac{\sin(\alpha-\beta)}{\cos\alpha\cos\beta} = \dfrac{\sin\alpha\cos\beta + \cos\alpha\sin\beta}{\cos\alpha\cos\beta} = \dfrac{\sin\alpha\cos\beta}{\cos\alpha\cos\beta} + \dfrac{\cos\alpha\sin\beta}{\cos\alpha\cos\beta} = \tan\alpha - \tan\beta$

17. Given that $\cos\theta = -\frac{60}{61}$ and $\sin\theta > 0$, determine the values of the sine and cosine functions for 2θ.

$\sin 2\theta =$ ____________ (Type an integer or a simplified fraction.)

$\cos 2\theta =$ ____________ (Type an integer or a simplified fraction.)

18. Use an identity to simplify the following expression.

$$\frac{\tan 10^\circ}{1 - \tan^2 10^\circ}$$

Choose the correct expression equal to $\frac{\tan 10^\circ}{1 - \tan^2 10^\circ}$ below.

- A. $\frac{1}{2}\tan 20^\circ$
- B. $\sin 20^\circ$
- C. $\frac{1}{2}\tan 10^\circ$
- D. $\frac{1}{2}\cos 10^\circ$

19. Use an identity to simplify the expression. Do not use a calculator.

$$\cos^2\left(\frac{\pi}{7}\right) - \sin^2\left(\frac{\pi}{7}\right)$$

$\cos^2\left(\frac{\pi}{7}\right) - \sin^2\left(\frac{\pi}{7}\right) =$ ____________

(Type an exact answer, using π as needed.)

20. Write the expression as a sum or difference of trigonometric functions.

$$6 \sin 4x \sin 6x$$

$6 \sin 4x \sin 6x =$ ____________

1. (1) $\sec^2 x$

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

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3. D. $-\sin^2 \theta$

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4. $\cos^2 t$

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5. $\cot \theta$

$\cos \theta$

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6. $65 + 16 \sin t$

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7. $\tan^2 \beta$

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8. D. $\left(1 - \sin^2 \alpha\right)\left(1 + \sin^2 \alpha\right) = \cos^2 \alpha \left(1 + \sin^2 \alpha\right) = \cos^2 \alpha \left(1 + 1 - \cos^2 \alpha\right) = 2 \cos^2 \alpha - \cos^4 \alpha$

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9. D. $\cos \alpha$

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10. $-\frac{33}{65}$

$-\frac{63}{65}$

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11. True

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12. A. $\cos(2\pi + x) = \cos 2\pi \cos x - \sin 2\pi \sin x = (1) \cos x - (0) \sin x = \cos x$

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13. $\sin 110^\circ$

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14. A. $\tan \frac{19\pi}{30}$

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15. $\frac{\sqrt{2} \cos x + \sqrt{2} \sin x}{2}$

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16. C. $\frac{\sin(\alpha-\beta)}{\cos\alpha\cos\beta} = \frac{\sin\alpha\cos\beta - \cos\alpha\sin\beta}{\cos\alpha\cos\beta} = \frac{\sin\alpha\cos\beta}{\cos\alpha\cos\beta} - \frac{\cos\alpha\sin\beta}{\cos\alpha\cos\beta} = \tan\alpha - \tan\beta$

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17. $-\frac{1320}{3721}$

$\frac{3479}{3721}$

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18. A. $\frac{1}{2}\tan 20^\circ$

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19. $\cos\frac{2\pi}{7}$

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20. $3\cos 2x - 3\cos 10x$
