Chapter 5 Practice Test

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Complete the identity.

1) $\sec x - \dfrac{1}{\sec x} = ?$

    A) $\sin x \tan x$ B) $-2 \tan^2 x$ C) $1 + \cot x$ D) $\sec x \csc x$

1) _____

2) $\dfrac{(\sin x + \cos x)^2}{1 + 2 \sin x \cos x} = ?$

    A) $1 - \sin x$ B) 1 C) 0 D) $- \sec^2 x$

2) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Verify the identity.

3) $\cot \theta \cdot \sec \theta = \csc \theta$

3) _____

4) $(1 + \tan^2 u)(1 - \sin^2 u) = 1$

4) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the exact value of the expression.

5) $\cos (260° - 20°)$

    A) $-\dfrac{1}{2}$ B) $-\dfrac{13}{3}$ C) $-\dfrac{\sqrt{3}}{2}$ D) $\dfrac{\sqrt{3}}{2}$

5) _____

6) $\cos \left(\dfrac{5\pi}{12} - \dfrac{\pi}{4} \right)$

    A) $\dfrac{\sqrt{3}}{2}$ B) $\dfrac{1}{2}$ C) 1 D) $\dfrac{1}{4}$

6) _____

7) $\cos (155°) \cos (35°) + \sin (155°) \sin (35°)$

    A) $-\sqrt{3}$ B) $-\dfrac{\sqrt{3}}{2}$ C) $-\dfrac{1}{2}$ D) -2

7) _____

Use the given information to find the exact value of the expression.

8) $\sin \alpha = \dfrac{3}{5}$, α lies in quadrant II, and $\cos \beta = \dfrac{2}{5}$, β lies in quadrant I   Find $\cos (\alpha - \beta)$.

    A) $\dfrac{6 - 4\sqrt{21}}{25}$ B) $\dfrac{6 + 4\sqrt{21}}{25}$ C) $\dfrac{-8 + 3\sqrt{21}}{25}$ D) $\dfrac{8 - 3\sqrt{21}}{25}$

8) _____

Find the exact value by using a sum or difference identity.

9) $\sin 165°$

A) $-\dfrac{\sqrt{2}(\sqrt{3}+1)}{4}$
B) $-\dfrac{\sqrt{2}(\sqrt{3}-1)}{4}$
C) $\dfrac{\sqrt{2}(\sqrt{3}+1)}{4}$
D) $\dfrac{\sqrt{2}(\sqrt{3}-1)}{4}$

9) _____

10) $\cos(45° + 60°)$

A) $\dfrac{\sqrt{2}(\sqrt{3}-1)}{4}$
B) $-\dfrac{\sqrt{2}(\sqrt{3}-1)}{4}$
C) $-\dfrac{\sqrt{2}(\sqrt{3}+1)}{4}$
D) $\dfrac{\sqrt{2}(\sqrt{3}+1)}{4}$

10) _____

Find the exact value of the expression.

11) $\sin 185° \cos 65° - \cos 185° \sin 65°$

A) $-\dfrac{\sqrt{3}}{2}$
B) $-\dfrac{1}{2}$
C) $\dfrac{37}{12}$
D) $\dfrac{\sqrt{3}}{2}$

11) _____

12) $\cos\dfrac{2\pi}{9}\sin\dfrac{\pi}{18} - \cos\dfrac{\pi}{18}\sin\dfrac{2\pi}{9}$

A) $\dfrac{\sqrt{3}}{2}$
B) $\dfrac{1}{4}$
C) $\dfrac{1}{2}$
D) 1

12) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Verify the identity.

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

13) _____

14) $\sin\left(\dfrac{3\pi}{2} - \theta\right) = -\cos\theta$

14) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the given information to find the exact value of the expression.

15) $\sin\alpha = \dfrac{21}{29}$, α lies in quadrant I, and $\cos\beta = \dfrac{5}{13}$, β lies in quadrant I   Find $\cos(\alpha + \beta)$.

A) $-\dfrac{135}{377}$
B) $-\dfrac{152}{377}$
C) $\dfrac{345}{377}$
D) $\dfrac{352}{377}$

15) _____

16) $\cos\alpha = -\dfrac{24}{25}$, α lies in quadrant III, and $\sin\beta = \dfrac{\sqrt{21}}{5}$, β lies in quadrant II   Find $\cos(\alpha + \beta)$.

A) $\dfrac{-14 + 24\sqrt{21}}{125}$
B) $\dfrac{48 + 7\sqrt{21}}{125}$
C) $\dfrac{-48 - 7\sqrt{21}}{125}$
D) $\dfrac{14 - 24\sqrt{21}}{125}$

16) _____

Use trigonometric identities to find the exact value.

17) $\dfrac{\tan 40° + \tan 110°}{1 - \tan 40° \tan 110°}$

A) -2
B) $-\sqrt{3}$
C) $-\dfrac{\sqrt{3}}{3}$
D) $-\dfrac{1}{2}$

17) _____

2

Find the exact value under the given conditions.

18) $\sin \alpha = \frac{24}{25}$, $0 < \alpha < \frac{\pi}{2}$; $\cos \beta = \frac{20}{29}$, $0 < \beta < \frac{\pi}{2}$ Find $\tan (\alpha + \beta)$.
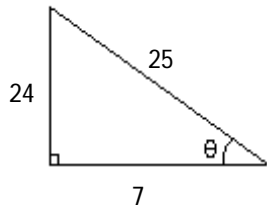
18) _____

A) $\frac{627}{725}$

B) $-\frac{627}{364}$

C) $-\frac{364}{725}$

D) $\frac{644}{725}$

19) $\tan \alpha = \frac{15}{8}$, $\pi < \alpha < \frac{3\pi}{2}$; $\cos \beta = -\frac{21}{29}$, $\frac{\pi}{2} < \beta < \pi$ Find $\tan (\alpha + \beta)$.

19) _____

A) $\frac{468}{493}$

B) $\frac{155}{468}$

C) $-\frac{11}{39}$

D) $\frac{155}{493}$

Use the figure to find the exact value of the trigonometric function.

20) Find $\tan 2\theta$.

20) _____

A) $-\frac{527}{625}$

B) $\frac{336}{625}$

C) $\frac{528}{527}$

D) $-\frac{336}{527}$

Use the given information to find the exact value of the expression.

21) $\cos \theta = \frac{21}{29}$, θ lies in quadrant IV   Find $\sin 2\theta$.

21) _____

A) $-\frac{840}{841}$

B) $\frac{840}{841}$

C) $-\frac{41}{841}$

D) $\frac{41}{841}$

22) $\sin \theta = \frac{24}{25}$, θ lies in quadrant II   Find $\tan 2\theta$.

22) _____

A) $-\frac{336}{527}$

B) $\frac{336}{527}$

C) $-\frac{526}{527}$

D) $\frac{336}{625}$

Write the expression as the sine, cosine, or tangent of a double angle. Then find the exact value of the expression.

23) $2 \sin 120° \cos 120°$

23) _____

A) $\frac{1}{2}$

B) $-\frac{1}{2}$

C) $-\frac{\sqrt{3}}{2}$

D) $\frac{\sqrt{3}}{2}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Verify the identity.

24) $\cos 4\theta = 2 \cos^2(2\theta) - 1$

24) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Rewrite the expression as an equivalent expression that does not contain powers of trigonometric functions greater than 1.

25) $8 \cos^2 x$

    A) $1 + \cos 2x$ B) $4 - 4 \cos 2x$ C) $4 + 4 \cos 2x$ D) $16 \cos x$

25) _____

26) $2 \sin^2 x \cos^2 x$

    A) $\frac{1}{2} - \frac{1}{2} \cos 4x$ B) $\frac{1}{2} \sin 2x$ C) $\frac{1}{4} - \frac{1}{4} \cos 2x$ D) $\frac{1}{4} - \frac{1}{4} \cos 4x$

26) _____

Use a half-angle formula to find the exact value of the expression.

27) $\sin 75°$

    A) $\frac{1}{2} \sqrt{2 + \sqrt{3}}$ B) $\frac{1}{2} \sqrt{2 - \sqrt{3}}$ C) $-\frac{1}{2} \sqrt{2 - \sqrt{3}}$ D) $-\frac{1}{2} \sqrt{2 + \sqrt{3}}$

27) _____

28) $\cos \dfrac{3\pi}{8}$

    A) $\frac{1}{2}\sqrt{2 - \sqrt{2}}$ B) $-\frac{1}{2}\sqrt{2 - \sqrt{2}}$ C) $\frac{1}{2}\sqrt{2 + \sqrt{2}}$ D) $-\frac{1}{2}\sqrt{2 + \sqrt{2}}$

28) _____

Use the given information to find the exact value of the trigonometric function.

29) $\sin \theta = \dfrac{1}{4}$, θ lies in quadrant I   Find $\sin \dfrac{\theta}{2}$.

    A) $\dfrac{\sqrt{8 - 2\sqrt{15}}}{4}$ B) $\dfrac{\sqrt{8 + 2\sqrt{15}}}{4}$ C) $\dfrac{\sqrt{6}}{4}$ D) $\dfrac{\sqrt{10}}{4}$

29) _____

30) $\sec \theta = 4$, θ lies in quadrant I   Find $\cos \dfrac{\theta}{2}$.

    A) $\dfrac{\sqrt{8 - 2\sqrt{15}}}{4}$ B) $\dfrac{\sqrt{10}}{4}$ C) $\dfrac{\sqrt{6}}{4}$ D) $\dfrac{\sqrt{8 + 2\sqrt{15}}}{4}$

30) _____

31) $\sin \theta = -\dfrac{3}{5}$, θ lies in quadrant IV   Find $\sin \dfrac{\theta}{2}$.

    A) $-\dfrac{\sqrt{5}}{5}$ B) $-\dfrac{\sqrt{30}}{10}$ C) $\dfrac{\sqrt{10}}{10}$ D) $\dfrac{\sqrt{5}}{5}$

31) _____

Express the product as a sum or difference.

32) $\sin 8x \cos 4x$

    A) $\frac{1}{2}(\sin 12x + \cos 4x)$ B) $\frac{1}{2}(\cos 12x - \cos 4x)$

    C) $\frac{1}{2}(\sin 12x + \sin 4x)$ D) $\sin (\cos 32x^2)$

32) _____

4

33) sin 2x sin 5x

A) $\frac{1}{2}$(cos 7x - sin 3x)

B) $\frac{1}{2}$(- cos 3x - cos 7x)

C) $\frac{1}{2}$(cos 3x - cos 7x)

D) sin² 10x²

33) _____

Express the sum or difference as a product.

34) cos 9x - cos 3x

A) -2 cos 6x sin 3x   B) -2 sin 6x sin 3x   C) 2 cos 3x   D) 2 cos 6x cos 3x

34) _____

35) sin 8x - sin 4x

A) 2 cos 4x cos 6x   B) 2 sin 6x cos 2x   C) 2 sin 2x cos 6x   D) 2 sin 2x

35) _____

Use substitution to determine whether the given x-value is a solution of the equation.

36) sin x = $-\frac{\sqrt{3}}{2}$, x = $\frac{-2\pi}{3}$

A) Yes   B) No

36) _____

37) tan x = $\frac{\sqrt{3}}{3}$, x = $\frac{7\pi}{6}$

A) Yes   B) No

37) _____

Find all solutions of the equation.

38) tan x = $\frac{\sqrt{3}}{3}$

A) x = $\frac{5\pi}{6}$ + 2nπ   B) x = $\frac{5\pi}{6}$ + nπ   C) x = $\frac{\pi}{6}$ + nπ   D) x = $\frac{2\pi}{3}$ + 2nπ

38) _____

39) 2 sin x - $\sqrt{3}$ = 0

A) x = $\frac{\pi}{3}$ + nπ or x = $\frac{2\pi}{3}$ + nπ

B) x = $\frac{\pi}{6}$ + 2nπ or x = $\frac{5\pi}{3}$ + 2nπ

C) x = $\frac{\pi}{6}$ + nπ or x = $\frac{5\pi}{3}$ + nπ

D) x = $\frac{\pi}{3}$ + 2nπ or x = $\frac{2\pi}{3}$ + 2nπ

39) _____

40) 5 sin x - 8$\sqrt{2}$ = 3 sin x- 7$\sqrt{2}$

A) x = $\frac{\pi}{4}$ + 2nπ or x = $\frac{3\pi}{4}$ + 2nπ

B) x = $\frac{5\pi}{4}$ + nπ or x = $\frac{7\pi}{4}$ + nπ

C) x = $\frac{5\pi}{4}$ + 2nπ or x = $\frac{7\pi}{4}$ + 2nπ

D) x = $\frac{\pi}{4}$ + nπ or x = $\frac{3\pi}{4}$ + nπ

40) _____

Solve the equation on the interval [0, 2π).

41) cos 2x = $\frac{\sqrt{2}}{2}$

A) 0, $\frac{2\pi}{3}$, π, $\frac{4\pi}{3}$

B) $\frac{\pi}{4}$, $\frac{3\pi}{4}$, $\frac{5\pi}{4}$, $\frac{7\pi}{4}$

C) $\frac{\pi}{8}$, $\frac{7\pi}{8}$, $\frac{9\pi}{8}$, $\frac{15\pi}{8}$

D) no solution

41) _____

42) $\cos^2 x + 2\cos x + 1 = 0$

A) π B) 2π C) $\dfrac{\pi}{4}, \dfrac{7\pi}{4}$ D) $\dfrac{\pi}{2}, \dfrac{3\pi}{2}$

43) $2\sin^2 x = \sin x$

A) $\dfrac{\pi}{3}, \dfrac{2\pi}{3}$ B) $\dfrac{\pi}{6}, \dfrac{5\pi}{6}$ C) $\dfrac{\pi}{2}, \dfrac{3\pi}{2}, \dfrac{\pi}{3}, \dfrac{2\pi}{3}$ D) $0, \pi, \dfrac{\pi}{6}, \dfrac{5\pi}{6}$

44) $\cos x = \sin x$

A) $\dfrac{\pi}{4}, \dfrac{7\pi}{4}$ B) $\dfrac{3\pi}{4}, \dfrac{5\pi}{4}$ C) $\dfrac{3\pi}{4}, \dfrac{7\pi}{2}$ D) $\dfrac{\pi}{4}, \dfrac{5\pi}{4}$

45) $\tan x + \sec x = 1$

A) 0 B) no solution C) $\dfrac{5\pi}{4}$ D) $\dfrac{\pi}{4}$

46) $\sin^2 x - \cos^2 x = 0$

A) $\dfrac{\pi}{4}, \dfrac{3\pi}{4}, \dfrac{5\pi}{4}, \dfrac{7\pi}{4}$ B) $\dfrac{\pi}{4}, \dfrac{\pi}{6}$ C) $\dfrac{\pi}{4}$ D) $\dfrac{\pi}{4}, \dfrac{\pi}{3}$

Solve the equation on the interval $[0, 2\pi)$.

47) $\tan^2 x \sin x = \tan^2 x$

A) $0, \dfrac{\pi}{2}$ B) $\dfrac{\pi}{2}, 2\pi$ C) $\dfrac{\pi}{2}, \pi$ D) $0, \pi$

Solve the equation on the interval $[0, 2\pi)$.

48) $\sin\left(x + \dfrac{5\pi}{4}\right) + \sin\left(x - \dfrac{5\pi}{4}\right) = 1$

A) $\dfrac{5\pi}{4}, \dfrac{5\pi}{6}$ B) $\dfrac{3\pi}{4}, \dfrac{5\pi}{6}$ C) $\dfrac{5\pi}{4}, \dfrac{7\pi}{4}$ D) $\dfrac{3\pi}{2}, 3\pi$

Use a calculator to solve the equation on the interval $[0, 2\pi)$. Round the answer to two decimal places.

49) $\cos x = 0.74$

A) 0.74, 3.88 B) 0.74, 5.55 C) 0.74, 2.31 D) 0.74, 2.40

50) $\sin x = -0.36$

A) 0.37, 5.91 B) 0.37, 3.51 C) 3.51, 5.91 D) 0.37, 1.94

Use a calculator to solve the equation on the interval $[0, 2\pi)$. Round to the nearest hundredth of a radian.

51) $\sin 2x - \sin x = 0$

A) 0, 1.05, 3.14, 5.24 B) 0, 2.09, 3.14, 4.19
C) 0, 2.09, 4.19 D) 1.05, 3.14, 5.24