

## PreCalc 12 Chapter 7 Review 2017 v1

### Multiple Choice

Identify the choice that best completes the statement or answers the question.

#### Easy

\_\_\_\_\_ 1. Use a graph to determine which of these values of  $x$  is NOT an approximate solution of the equation  $\cos x = \frac{1}{3}$ .

A.  $x \doteq 1.23$

C.  $x \doteq -1.23$

B.  $x \doteq 4.37$

D.  $x \doteq 5.05$

\_\_\_\_\_ 2. The first two positive roots of the equation  $\cos 5\pi x = -\frac{1}{6}$  are approximately 0.11 and 0.29.

Which expression represents the general solution, where  $k \in \mathbf{Z}$ ?

A.  $x \doteq 0.11 + \frac{1}{5}k$  or  $x \doteq 0.29 + \frac{1}{5}k$

C.  $x \doteq 0.11 + \frac{2\pi}{5}k$  or  $x \doteq 0.29 + \frac{2\pi}{5}k$

B.  $x \doteq 0.11 + \frac{2}{5}k$  or  $x \doteq 0.29 + \frac{2}{5}k$

D.  $x \doteq 0.11 + \frac{\pi}{5}k$  or  $x \doteq 0.29 + \frac{\pi}{5}k$

\_\_\_\_\_ 3. Which of these values of  $x$  is NOT a solution of the equation  $\sin x = -\frac{1}{2}$ ?

A.  $x = \frac{-5\pi}{6}$

C.  $x = \frac{2\pi}{3}$

B.  $x = \frac{7\pi}{6}$

D.  $x = \frac{11\pi}{6}$

\_\_\_\_\_ 4. Which of these values of  $x$  is NOT a solution of the equation  $\sqrt{3} \csc x = -2$ ?

A.  $x = \frac{-2\pi}{3}$

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

B.  $x = \frac{5\pi}{6}$

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

\_\_\_\_\_ 5. What are the exact roots of the equation  $\tan x = \frac{1}{\sqrt{3}}$  for  $0 \leq x \leq 2\pi$ ?

A.  $x = \frac{-5\pi}{6}$  or  $x = \frac{\pi}{6}$

C.  $x = \frac{\pi}{6}$  or  $x = \frac{7\pi}{6}$

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

D.  $x = \frac{-5\pi}{6}$  or  $x = \frac{2\pi}{3}$

\_\_\_\_\_ 6. Write the expression  $\frac{\csc^2 \theta}{\cot^2 \theta}$  as a single term.

- A.  $\cos^2 \theta$   
B.  $\sec^2 \theta$

- C.  $\tan^2 \theta$   
D.  $\sin^2 \theta$

\_\_\_\_\_ 7. Write the expression  $\frac{\sin^2 \theta}{\cos^2 \theta}$  as a single term.

- A.  $\cot^2 \theta$   
B.  $\sin^2 \theta$

- C.  $\cos^2 \theta$   
D.  $\tan^2 \theta$

\_\_\_\_\_ 8. Write the expression  $\frac{\sin \theta \cos \theta \csc \theta}{\cot \theta}$  as a single term.

- A.  $\csc \theta$   
B.  $\sin \theta$

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

\_\_\_\_\_ 9. What are the non-permissible values of  $\theta$  for  $\sec \theta$ ?

A.  $\theta \neq \pi k, k \in \mathbf{Z}$

C.  $\theta \neq \frac{\pi}{2} + \pi k, k \in \mathbf{Z}$

B.  $\theta \neq \frac{\pi}{2} + 2\pi k, k \in \mathbf{Z}$

D.  $\theta \neq 2\pi k, k \in \mathbf{Z}$

\_\_\_\_\_ 10. What are the non-permissible values of  $\theta$  for the expression  $\csc \theta(-\cos^2 \theta + 1)$ ?

A.  $\theta \neq \pi k, k \in \mathbf{Z}$

C.  $\theta \neq \frac{\pi k}{2}, k \in \mathbf{Z}$

B. All real values are permissible.

D.  $\theta \neq \frac{\pi}{2} + \pi k, k \in \mathbf{Z}$

\_\_\_\_\_ 11. Write the expression  $\sin 2\theta \cos \theta + \cos 2\theta \sin \theta$  as a single term.

- A.  $\cos \theta$   
B.  $\cos 3\theta$

- C.  $\sin 3\theta$   
D.  $\sin \theta$

\_\_\_\_\_ 12. What is the exact value of the expression  $2 \sin\left(\frac{7\pi}{12}\right) \cos\left(\frac{7\pi}{12}\right)$ ?

A.  $-\frac{1}{2}$

C.  $-\frac{1}{\sqrt{3}}$

B.  $\frac{1}{\sqrt{3}}$

D.  $\frac{1}{2}$

\_\_\_\_\_ 13. Write the expression  $\cos^2 5\theta - \sin^2 5\theta$  as a single term.

A.  $\sin 10\theta$

C.  $\cos 10\theta$

B. 1

D.  $\cos 25\theta$

\_\_\_\_\_ 14. What is the exact value of the expression  $2 \cos^2\left(\frac{7\pi}{12}\right) - 1$ ?

A.  $-\frac{\sqrt{3}}{2}$

C.  $\frac{1}{\sqrt{3}}$

B.  $-\frac{1}{\sqrt{3}}$

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

\_\_\_\_\_ 15. What is the exact value of the expression  $\frac{2 \tan\left(\frac{5\pi}{8}\right)}{1 - \tan^2\left(\frac{5\pi}{8}\right)}$ ?

A.  $\frac{1}{\sqrt{2}}$

C. -1

B. 1

D.  $-\frac{1}{\sqrt{2}}$

**Moderate** (Show work for non-MC)

\_\_\_\_\_ 16. Use a graph to determine which of these values of  $x$  is NOT an approximate solution of the equation  $7 \tan x + 7 = -\tan^2 x$ .

A.  $x \doteq -0.09$

C.  $x \doteq -0.88$

B.  $x \doteq -1.40$

D.  $x \doteq 1.74$

- \_\_\_\_\_ 17. What are the solutions of the equation  $3 \tan x + 2 = -\tan^2 x$  for  $0 \leq x \leq \pi$ , to the nearest hundredth?
- A.  $x \doteq 135.00$  or  $x \doteq 116.57$                       C.  $x \doteq 1.57$  or  $x \doteq 1.25$   
 B.  $x \doteq 1.57$  or  $x \doteq 2.36$                               D.  $x \doteq 2.36$  or  $x \doteq 2.03$
- \_\_\_\_\_ 18. What are the solutions of the equation  $\sin 5x = \frac{5}{7}$  for  $0 \leq x \leq \frac{2\pi}{5}$ , to the nearest hundredth?
- A.  $x \doteq 9.12$     C.  $x \doteq 0.16$  or  $x \doteq 0.47$   
 B.  $x \doteq 0.80$  or  $x \doteq 2.35$                               D.  $x \doteq 0.16$  or  $x \doteq 0.79$
- \_\_\_\_\_ 19. What are the solutions of the equation  $2 \tan 3\pi x = -1$  for  $0 \leq x \leq \frac{2}{3}$ , to the nearest hundredth?
- A.  $x \doteq 16.28$     C.  $x \doteq 0.28$  or  $x \doteq 0.62$   
 B.  $x \doteq 0.12$  or  $x \doteq 0.28$                               D.  $x \doteq 2.68$  or  $x \doteq 5.82$
- \_\_\_\_\_ 20. What are the exact roots of the equation  $\csc x = -\sqrt{2}$  for  $0 \leq x \leq 2\pi$ ?
- A.  $x = \frac{5\pi}{4}$  or  $x = \frac{7\pi}{4}$                                       C.  $x = \frac{-\pi}{4}$  or  $x = \frac{5\pi}{4}$   
 B.  $x = \frac{\pi}{4}$  or  $x = \frac{3\pi}{4}$                                       D.  $x = \frac{-\pi}{4}$  or  $x = \frac{\pi}{4}$
- \_\_\_\_\_ 21. Write the expression  $\frac{\sqrt{-\sin^2 \theta + 1}}{\sqrt{\tan^2 \theta + 1}}$  as a single term.
- A.  $\cos^2 \theta$     C.  $-\sec^2 \theta$   
 B.  $\cos \theta$     D.  $-\cos^2 \theta$
- \_\_\_\_\_ 22. What is the exact value of the expression  $\cos 545^\circ \cos 245^\circ + \sin 545^\circ \sin 245^\circ$ ?
- A.  $-\sqrt{3}$     C.  $\sqrt{3}$   
 B.  $-\frac{1}{2}$     D.  $\frac{1}{2}$
- \_\_\_\_\_ 23. What is the exact value of the expression  $\sin \frac{5\pi}{6} \cos \frac{3\pi}{2} - \cos \frac{5\pi}{6} \sin \frac{3\pi}{2}$ ?
- A.  $-\frac{\sqrt{3}}{2}$     C.  $\frac{\sqrt{3}}{2}$   
 B.  $\sqrt{3}$     D.  $-\sqrt{3}$

- \_\_\_ 24. What is the exact value of the expression  $\cos \frac{\pi}{6} \cos \frac{\pi}{12} - \sin \frac{\pi}{6} \sin \frac{\pi}{12}$ ?
- A.  $-\frac{1}{\sqrt{2}}$       C. -1  
 B. 1      D.  $\frac{1}{\sqrt{2}}$
- \_\_\_ 25. What is the solution of the equation  $\sin 3x \cos 2x - \cos 3x \sin 2x = -\frac{1}{\sqrt{2}}$  over the domain  $0 \leq x \leq 2\pi$ ?
- A.  $x = \frac{7\pi}{4}$  or  $x = \frac{5\pi}{4}$       C.  $x = \frac{5\pi}{4}$  or  $x = \frac{15\pi}{4}$   
 B.  $x = \frac{3\pi}{4}$  or  $x = \frac{\pi}{4}$       D.  $x = \frac{7\pi}{4}$  or  $x = \frac{3\pi}{4}$
- \_\_\_ 26. What is the solution of the equation  $\frac{\tan 3x - \tan 2x}{1 + \tan 3x \tan 2x} = -1$  over the domain  $0 \leq x \leq 2\pi$ ?
- A.  $x = \frac{7\pi}{4}$  or  $x = \frac{3\pi}{4}$       C.  $x = \frac{3\pi}{4}$  or  $x = \frac{15\pi}{4}$   
 B.  $x = \frac{\pi}{4}$  or  $x = \frac{5\pi}{4}$       D.  $x = \frac{7\pi}{4}$  or  $x = \frac{\pi}{4}$

**Short Answer****Easy**

27. The first two positive roots of the equation  $\cos 5x = \frac{5}{6}$  are  $x \approx 0.12$  and  $x \approx 1.14$ . Determine the general solution of this equation.

28. Write the general solution of the equation  $-3 \sin x - 3 = -5 \sin x - 1$ . Give exact answers.

**Moderate (Show work for non-MC)**

29. Solve the equation  $6 \cos x = x^2 + 4x$  over the set of real numbers. Give the answers to the nearest hundredth.
30. Solve the equation  $4 \cos^2 x = 1$  over the domain  $2\pi \leq x \leq 3\pi$ . Give exact answers.

31. Use algebra to solve the equation  $\cos x \cot x \sec x \sin x = -\frac{2}{3}$  over the domain  $0 \leq x \leq 2\pi$ .  
Give the answers to the nearest hundredth.
32. Write the expression  $\frac{\cot^2 \theta + \csc^2 \theta + 1}{\sin^3 \theta}$  as a single term.
33. Determine the exact value of  $\sin \frac{5\pi}{12}$ .
34. Given  $\sin \alpha = -\frac{35}{37}$  and  $\cos \beta = -\frac{12}{13}$ , where angle  $\alpha$  is in standard position with its terminal arm in Quadrant 4 and angle  $\beta$  is in standard position with its terminal arm in Quadrant 3; determine the exact value of  $\cos(\alpha + \beta)$ .
35. Given angle  $\theta$  in standard position with its terminal arm in Quadrant 4 and  $\tan \theta = -\frac{8}{15}$ , determine the exact value of  $\sin 2\theta$ .

**Difficult** (Show work for non-MC)

36. Determine the amplitude of the graph of  $y = \cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right)$ .

### Problem

**Easy**

37. Prove the identity  $\tan^2 \theta = \sec^2 \theta - \cos \theta \sec \theta$ .

**Moderate** (Show work for non-MC)

38. a) Solve  $-3 + 8 \cos 5x = -5$  over the domain  $0 \leq x < \frac{2\pi}{5}$ . Give the roots to the nearest hundredth.  
b) Determine the general solution of the equation.

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39. Use algebra to solve the equation  $-10 \sin^2 x + 11 \sin x = 3$  over the domain  $0 \leq x \leq 360^\circ$ .  
Give the answers to the nearest degree.

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40. Prove the identity  $\cot^2 \theta \sin \theta = \frac{2 \csc \theta}{\sec^2 \theta} - \cos \theta \cot \theta$ .

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41. Prove the identity  $\tan\left(\frac{\pi}{4} + \theta\right) + \tan\left(\frac{\pi}{4} - \theta\right) = \frac{2 \sec^2 \theta}{1 - \tan^2 \theta}$ .

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Name: \_\_\_\_\_

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**Difficult** (Show work for non-MC)

42. Prove the identity  $\frac{\cot \theta + \csc \theta + \cos \theta}{\cot \theta} - \sin \theta = \csc \theta (\sin \theta + \tan \theta)$ .

43. Prove the identity  $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \frac{\cos 2\theta}{1 + \sin 2\theta}$ .

44. Prove the identity  $\frac{\cos \theta \cos 2\theta}{1 + \cos 2\theta} = \frac{\sin \theta (1 + \cos 4\theta)}{\sin 4\theta}$ .