

Advanced Trigonometric Foundations

Trigonometry · Answer Key · 8 Questions

1. In the context of the Fourier series representation of a periodic function, what is the value of the integral of $\sin(mx)\sin(nx)dx$ over the interval $[-\pi, \pi]$ when m and n are distinct positive integers?

- A) π
- B) 2π
- C) 0**
- D) 1

2. According to Euler's formula, $e^{i\theta} = \cos(\theta) + i \sin(\theta)$, what is the exact value of $e^{i\pi} + 1$?

- A) i
- B) 1
- C) 0**
- D) -1

3. In spherical trigonometry, the Law of Cosines for sides states that for a spherical triangle with sides a , b , c and angle C , which equation is correct?

- A) $\cos(c) = \cos(a)\cos(b) + \sin(a)\sin(b)\cos(C)$**
- B) $\cos(c) = \cos(a)\cos(b) - \sin(a)\sin(b)\cos(C)$
- C) $\cos(c) = \sin(a)\sin(b) + \cos(a)\cos(b)\cos(C)$
- D) $\cos(c) = \cos(a)\cos(b) + \cos(a)\cos(b)\sin(C)$

4. The Gudermannian function, $\text{gd}(x)$, relates circular and hyperbolic functions. Which of the following defines $\sin(\text{gd}(x))$?

- A) $\sinh(x)$
- B) $\tanh(x)$**
- C) $\text{sech}(x)$
- D) $\cosh(x)$

5. In signal processing, the Nyquist-Shannon sampling theorem relies on the representation of signals as a sum of sines and cosines. What is the fundamental period of the function $\sin(3x) + \cos(5x)$?

- A) π
- B) 2π**
- C) $2\pi/3$
- D) $\pi/2$

6. The value of the secant of an angle in a right triangle is the reciprocal of which trigonometric ratio?

- A) Sine
- B) Tangent
- C) Cosine**
- D) Cosecant

7. What is the exact value of the sine of 15 degrees, derived from the half-angle or angle subtraction identities?

- A) $(\sqrt{6} - \sqrt{2})/4$**
- B) $(\sqrt{6} + \sqrt{2})/4$
- C) $(\sqrt{3} - 1)/2$
- D) $(\sqrt{2} - 1)/2$

8. In the complex plane, the modulus of the trigonometric form $r(\cos \theta + i \sin \theta)$ is given by which parameter?

- A) θ
- B) i
- C) r**
- D) $\cos \theta$