

Multiple Choice: Select the letter of the most appropriate answer and shade in the corresponding region on the answer sheet.

1. Suppose $\sin \theta > 0$ and $\tan \theta > 0$. What quadrant must angle θ lie in?

- A) I. B) II. C) III. D) IV. E) none

2. Which of the trigonometric functions below has period $\frac{2}{3}$? (x is in radians)

- A) $\sin(2\pi x - 1)$ B) $\sin(2x - 3)$ C) $\sin(3\pi x - 3)$ D) $\sin(3x + 1)$ E) none

3. Suppose $\cos \theta = \frac{2}{3}$, $\sin \theta = -\frac{3}{5}$. Find $\tan \theta$.

- A) $-\frac{9}{10}$ B) $-\frac{10}{9}$ C) $-\frac{2}{5}$ D) $-\frac{5}{2}$ E) none

4. How many solutions are there to the equation $\sin 4x = 3$ for $0 \leq x \leq 2\pi$? (x is in radians)

- A) 2 B) 4 C) 6 D) 8 E) none

5. If $\cos \theta = \frac{1}{5}$, then what must $\cos(2\theta)$ be?

- A) $-\frac{23}{25}$ B) $\frac{2}{5}$ C) $-\frac{2}{5}$ D) $\frac{23}{25}$ E) none

6. Evaluate $\cos^2 15^\circ - \sin^2 15^\circ$.

- A) $\frac{\sqrt{2}}{2}$ B) $\frac{\sqrt{3}}{2}$ C) $-\frac{\sqrt{2}}{2}$ D) 1 E) none

7. Which of the following is an equivalent expression for $\tan x$? (here x is an angle measured in radians)

- A) $\tan(\pi - x)$ B) $\tan(\pi + x)$ C) $\tan\left(\frac{\pi}{2} + x\right)$ D) $\tan\left(\frac{\pi}{2} - x\right)$ E) none

8. Suppose $\cot \theta = \sqrt{8}$. Find $\csc \theta$, given that θ is a third quadrant angle.

- A) -9 B) 9 C) 3 D) -3 E) none

No calculators allowed

Pittsburg State University

Trigonometry - Team Event

Team Member #2

2019 Math Relays

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9. Which of the trigonometric functions below has period $\frac{\pi}{4}$? (x is in radians)

- A) $\cos(4\pi x - 1)$ B) $\cos(8\pi x - 3)$ C) $\cos(4x - 3)$ D) $\cos(8x + 1)$ E) none

10. Suppose $\cos \theta = -\frac{3}{5}$, $\sin \theta = -\frac{2}{5}$. Find $\cot \theta$.

- A) $-\frac{3}{2}$ B) $\frac{3}{2}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$ E) none

11. How many solutions are there to the equation $\cos 4x = -\frac{1}{7}$? for $0 \leq x \leq 2\pi$ (x is in radians)

- A) 2 B) 4 C) 6 D) 8 E) none

12. Evaluate $2 \sin \frac{\pi}{8} \cos \frac{\pi}{8}$.

- A) $\frac{\sqrt{2}}{2}$ B) $-\frac{\sqrt{2}}{2}$ C) $\sqrt{2}$ D) $-\sqrt{2}$ E) none

13. Suppose $\sec \theta = -5$. Find $\tan \theta$, given that θ is a third quadrant angle.

- A) $-2\sqrt{6}$ B) $2\sqrt{6}$ C) $2\sqrt{3}$ D) $-2\sqrt{3}$ E) none

14. Evaluate $\tan 15^\circ$

- A) $\frac{\sqrt{2} - \sqrt{6}}{4}$ B) $\frac{\sqrt{2} + \sqrt{6}}{4}$ C) $2 - \sqrt{3}$ D) $2 + \sqrt{3}$ E) none

15. Which of the following is an equivalent expression for $\tan x$? (here x is an angle measured in radians)

- A) $\cot\left(\frac{\pi}{2} - x\right)$ B) $\cot\left(\frac{\pi}{2} + x\right)$ C) $\cot(\pi + x)$ D) $\cot(\pi - x)$ E) none

16. Suppose $\cos \theta > 0$ and $\tan \theta < 0$. What quadrant must angle θ lie in?

- A) I. B) II. C) III. D) IV. E) none

No calculators allowed

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Trigonometry - Team Event

Team Member #3

2019 Math Relays

Multiple Choice: Select the letter of the most appropriate answer and shade in the corresponding region on the answer sheet.

17. Suppose $\cos \theta = -\frac{1}{3}$. Find $\sin \theta$, given that θ is a second quadrant angle.

- A) $-\frac{2\sqrt{2}}{3}$ B) $\frac{2\sqrt{2}}{3}$ C) $\frac{\sqrt{3}}{2}$ D) $-\frac{\sqrt{3}}{2}$ E) none

18. Which of the following is an equivalent expression for $\cos x$? (here x is an angle measured in radians)

- A) $\sin(\pi + x)$ B) $\sin(\pi - x)$ C) $\cos(4\pi + x)$ D) $\cos(3\pi - x)$ E) none

19. Which of the trigonometric functions below has period 2π ? (x is in radians)

- A) $\tan x$ B) $\tan 2x$ C) $\tan \frac{x}{2}$ D) $\tan 2\pi x$ E) none

20. How many solutions are there to the equation $\tan 2x = 5$ for $0 \leq x \leq 2\pi$? (x is in radians)

- A) 2 B) 4 C) 6 D) 8 E) none

21. Suppose $\csc \theta > 0$ and $\sec \theta < 0$. What quadrant must angle θ lie in?

- A) I. B) II. C) III. D) IV. E) none

22. Suppose $\tan \theta = 3$, $\cos \theta = -\frac{1}{6}$. Find $\sin \theta$.

- A) $-\frac{1}{2}$ B) $\frac{1}{2}$ C) 2 D) -2 E) none

23. Evaluate $\cos 105^\circ$

- A) $\frac{\sqrt{2} - \sqrt{6}}{4}$ B) $\frac{\sqrt{2} + \sqrt{6}}{4}$ C) $\frac{2 + \sqrt{3}}{4}$ D) $\frac{2 - \sqrt{3}}{4}$ E) none

24. Evaluate $\sin 101^\circ \cos 11^\circ - \cos 101^\circ \sin 11^\circ$

- A) 1 B) 0 C) -1 D) $\frac{1}{2}$ E) none

No calculators allowed

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Trigonometry - Team Event

Team Member #4

2019 Math Relays

Multiple Choice: Select the letter of the most appropriate answer and shade in the corresponding region on the answer sheet.

25. Suppose $\cot \theta = -3$, $\cos \theta = -\frac{1}{9}$. Find $\sin \theta$.

- A) 27 B) -27 C) $\frac{1}{6}$ D) $\frac{1}{3}$ E) none

26. Which of the following is an equivalent expression for $\sin x$? (here x is an angle measured in radians)

- A) $\cos\left(\frac{\pi}{2} + x\right)$ B) $\cos\left(\frac{\pi}{2} - x\right)$ C) $\sin(\pi + x)$ D) $\sin(\pi - x)$ E) none

27. Suppose $\tan \theta > 0$ and $\cos \theta < 0$. What quadrant must angle θ lie in?

- A) I. B) II. C) III. D) IV. E) none

28. Suppose $\sin \theta = \frac{1}{2}$. Find $\cos \theta$, given that θ is a first quadrant angle.

- A) $\frac{\sqrt{3}}{2}$ B) $-\frac{\sqrt{3}}{2}$ C) $\frac{1}{2}$ D) $-\frac{1}{2}$ E) none

29. Which of the trigonometric functions below has period 3? (x is in radians)

- A) $\cot 3x$ B) $\cot \frac{x}{3}$ C) $\cot \frac{3x}{\pi}$ D) $\cot \frac{\pi x}{3}$ E) none

30. How many solutions are there to the equation $\sec 2x = \frac{\sqrt{3}}{2}$ for $0 \leq x \leq 2\pi$? (x is in radians)

- A) 2 B) 4 C) 6 D) 8 E) none

31. Evaluate $\sin 75^\circ$

- A) $\frac{\sqrt{2} - \sqrt{6}}{4}$ B) $\frac{\sqrt{2} + \sqrt{6}}{4}$ C) $\frac{2 + \sqrt{3}}{4}$ D) $\frac{2 - \sqrt{3}}{4}$ E) none

32. Evaluate $\frac{\tan 20^\circ - \tan 65^\circ}{1 + \tan 20^\circ \tan 65^\circ}$

- A) 1 B) 0 C) -1 D) $\frac{1}{2}$ E) none

Thank you for participating in the Pittsburg State Math Relays!