

MU ALPHA THETA - MAINE '95  
TRIGONOMETRIC EQUATIONS, IDENTITIES, & INEQUALITIES

TOPIC TEST

1. The largest value of  $x$  less than  $2\pi$  radians that satisfies the equation  $2\sin^2x - 3\sin x + 1 = 0$  is
- a.  $\frac{\pi}{6}$       b.  $\frac{5\pi}{6}$       c.  $\frac{\pi}{2}$       d.  $\frac{7\pi}{6}$       e. not given
2. If neither  $\sin x$  nor  $\cos x$  equals 0, then  $\cos^2x \left[ \frac{1}{\cos^2x} + \frac{1}{\sin^2x} \right] =$
- a.  $\frac{1}{\tan^2x}$       b.  $\frac{1}{\sin^2x}$       c.  $\frac{1}{\sec^2x}$       d.  $\frac{1}{\csc^2x}$       e. not given
3. Evaluate:  $\frac{\sin \frac{\pi}{6} \csc 210^\circ - \tan \frac{5\pi}{4}}{\cos 330^\circ}$
- a.  $\frac{-4\sqrt{3}}{3}$       b. -4      c.  $\frac{-\sqrt{3}}{3}$       d. 0      e. not given
4. Solve for  $x$ :  $2\tan^2 2x + \sec 2x + 1 = 0$  where  $0 \leq x \leq 2\pi$ .
- a.  $0, \frac{\pi}{2}$       b.  $\pi, \frac{3\pi}{2}$       c.  $\frac{\pi}{2}, \frac{3\pi}{2}$       d.  $0, \pi$       e. not given
5. If  $\sin A = \frac{3}{5}$ ,  $90^\circ < A < 180^\circ$ ,  $\cos B = \frac{1}{3}$ , and  $270^\circ < B < 360^\circ$ , the value of  $\sin(A + B)$  is. State your answer rounded to the nearest hundredth.
- a. -.55      b. -.83      c. .73      d. .95      e. not given
6. In Triangle ABC, if  $AB = 6$ ,  $AC = 4$ , and the degree measure of Angle A is 30, the area of the triangle is
- a. 2      b. 3      c. 6      d. 12      e. not given

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7. If  $\tan 40^\circ = k$  and  $\tan y = -k$ , then  $y$  is equal to  
I.  $40^\circ$  II.  $140^\circ$  III.  $220^\circ$  IV.  $320^\circ$
- a. II only    b. IV only    c. II and III only    d. II and IV only    e. not given
8. The sides of a triangle are 3, 5, and 7. the value of the cosine of the smallest angle of the triangle is
- a.  $\frac{5}{7}$     b.  $\frac{13}{14}$     c.  $\frac{11}{13}$     d.  $\frac{8}{13}$     e. not given
9. As angle  $x$  increases from  $\frac{\pi}{4}$  to  $\frac{5\pi}{4}$  radians,  $\cos x$
- a. increases throughout the interval    b. decreases throughout the interval  
c. increases, then decreases    d. decreases, then increases  
e. not given
10. Find the largest value of  $x$ , in radians, for  $2 \cos^2 2x - \sin 2x + 1 = 0$ ,  $0 \leq x \leq 2\pi$ .
- a.  $\frac{7\pi}{6}$     b.  $\frac{5\pi}{4}$     c.  $\frac{4\pi}{3}$     d.  $\frac{17\pi}{12}$     e. not given
11. Simplify:  $\sin(150^\circ + x) + \sin(150^\circ - x)$
- a.  $\cos x$     b.  $-\cos x$     c.  $-\sin x$     d.  $\sin x$     e. not given
12. One of the five-fifth of roots of 1 is
- a.  $\cos 288^\circ + i \sin 288^\circ$     b.  $\cos 45^\circ + i \sin 45^\circ$     c.  $\cos 50^\circ + i \sin 50^\circ$   
d.  $\cos 90^\circ + i \sin 90^\circ$     e. not given

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13. Find the exact value of

$$\csc 2A(1 - \cos 2A) + \frac{1 + \tan^2 A}{2 \tan A} + \csc 2A + \cot 2A \text{ if } \sin A = \frac{5}{13} \text{ and } 90^\circ < A < 180^\circ.$$

- a.  $\frac{169}{60}$       b.  $\frac{-169}{20}$       c.  $\frac{-169}{40}$       d.  $\frac{5}{13}$       e. not given

14. The value of  $\cos\left[2 \cdot \text{Arc sin}\left(\frac{-3}{5}\right)\right]$  is

- a.  $\frac{4}{5}$       b.  $\frac{9}{25}$       c.  $\frac{7}{25}$       d.  $\frac{-7}{25}$       e. not given

15. Find the smallest value of  $x$  where  $180^\circ \leq x \leq 270^\circ$  and  $4 \cos 3x = \sec 3x$ . All answers are in degrees.

- a. 190      b. 200      c. 210      d. 220      e. not given

16. If  $\text{Arctan } x + \text{Arctan } y = \text{Arctan } \frac{\pi}{4}$ , then

- a.  $\frac{x+y}{1-xy} = 1$       b.  $\frac{x+y}{1-xy} = \frac{\pi}{4}$       c.  $x+y = \frac{\pi}{4}$       d.  $x+y = 1$       e. not given

17. Simplify:  $\frac{\sin x \cos^2 x}{1 - \sin x} =$

- a.  $\sin x - \sin^2 x$       b.  $\sin^2 x - \sin x$       c.  $\sin x + \sin^2 x$       d.  $\cos x + \cos^2 x$   
 e. not given

18. Find all radian solutions for  $\sin 2x \cos x + \cos 2x \sin x = \frac{1}{\sqrt{2}}$ .

- a.  $\{x/x = \frac{\pi}{4} + 2\pi k\}$       b.  $\{x/x = \frac{\pi}{12} + \frac{2\pi}{3}k \text{ or } x = \frac{\pi}{4} + \frac{2\pi}{3}k\}$   
 c.  $\{x/x = \frac{\pi}{8} + \frac{\pi}{2}k \text{ or } x = \frac{\pi}{8} - \pi k\}$       d.  $\{x/x = \frac{\pi}{8} + \pi k\}$       e. not given

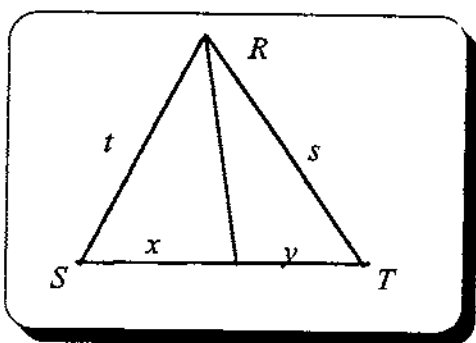
TOPIC TESTS 2

30-QUESTIONS, 45-MINUTES

TRIGONOMETRIC EQUATIONS, IDENTITIES, & INEQUALITIES

19. When only principal values are <sup>considered</sup>  $\text{Arcsin}\left(\frac{-5}{13}\right) + \text{Arccos}\left(\frac{-3}{5}\right)$  represents an angle lying in which quadrant?

- a. I            b. II            c. III            d. IV  
 e. This value does not lie in a quadrant.



20. In the figure above, RP bisects angle SRT. Which of the following is equal to  $\frac{x}{y}$ ?

- a.  $\frac{t^2}{s^2}$             b.  $\frac{S}{T}$             c.  $\frac{\sin T}{\sin S}$             d.  $\frac{\cos S}{\cos T}$             e. not given

21. 
$$\frac{\sin 5x \cos x - \sin x \cos 5x}{2 \sin 2x}$$

- a.  $\sin 3x$             b.  $\frac{\cot 2x}{2}$             c.  $\frac{1}{2}$             d.  $\cos 2x$             e. not given

22. <sup>Solve for x:</sup>  
 $x > \sin x$  where x is in degree measure.

- a. all  $x > 0$             b. all  $x < 0$             c. all x for which  $x \neq 0$             d. all x            e. not given

23. Solve the equation  $\sin^6 x + \cos^6 x = \frac{1}{4}$  where  $0 \leq x \leq \pi$

- a.  $\frac{\pi}{4}$             b.  $\frac{\pi}{4}, \frac{3\pi}{4}$             c.  $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}$             d.  $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$             e. not given

24. What is the amplitude of the graph of the function  $y = \cos^4 x - \sin^4 x$ ?

- a.  $\frac{1}{2}$       b.  $\frac{\sqrt{2}}{2}$       c. 1      d.  $\frac{2+\sqrt{2}}{2}$       e. not given

25. If  $\sin 37^\circ = z$  then  $\sin 74^\circ$  equals.

- a.  $2z\sqrt{1-z^2}$       b.  $2z^2 + 1$       c.  $2z$       d.  $2z^2 - 1$       e. not given

26. What values of  $x$  satisfy the inequality  $\sin 2x < \sin x$  in the interval  $0 \leq x \leq 2\pi$ ?

- a.  $\frac{\pi}{3} < x < \frac{5\pi}{3}$       b.  $0 < x < \frac{\pi}{3}$  or  $\frac{5\pi}{3} < x < 2\pi$       c.  $\frac{2\pi}{3} < x < 2\pi$   
d.  $\frac{\pi}{3} < x < \pi$  or  $\frac{5\pi}{3} < x < 2\pi$       e. not given

27. In  $\triangle ABC$ ,  $a = 2$ ,  $b = 3$  and  $c = 4$ . If  $\angle C$  is opposite side  $c$ ,  $\cos \frac{1}{2} C$  is equal to

- a.  $\frac{\sqrt{3}}{2}$       b.  $\frac{\sqrt{6}}{4}$       c.  $\frac{\sqrt{3}}{4}$       d.  $\frac{-1}{4}$       e. not given

28. Simplify:  $\frac{\cos^2 \frac{1}{2}x - \cos x + \sin^2 \frac{1}{2}x}{\sin^2 \frac{1}{2}x}$

- a. undefined      b. 0      c. 2      d.  $\tan \frac{1}{2}x$       e. not given

29. The smaller angle between two intersecting lines is  $43^\circ 24'$  and a circle whose radius is 3187 feet is tangent to both lines. Find the distance from the point of tangency to the point of intersection of the two lines, in feet, when the circle is in the smaller angle. (Give answer to the nearest foot.)

- a. 3370      b. 8009      c. 8041      d. 8619      e. not given

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TRIGONOMETRIC EQUATIONS, IDENTITIES, & INEQUALITIES

30. For how many values of  $x$ , where  $0^\circ \leq x < 360^\circ$  <sup>is</sup> ~~for which~~  $\sin 2x \leq \tan x$ ?

- a.  $45^\circ \leq x < 90^\circ$  or  $315^\circ \leq x < 360^\circ$
- b.  $45^\circ < x < 90^\circ$  or  $135^\circ < x < 180^\circ$  or  $225^\circ < x < 270^\circ$  or  $315^\circ < x < 360^\circ$
- c.  $45^\circ \leq x < 90^\circ$  or  $135^\circ \leq x < 180^\circ$  or  $225^\circ \leq x < 270^\circ$  or  $315^\circ \leq x < 360^\circ$
- d.  $45^\circ \leq x \leq 90^\circ$  or  $135^\circ \leq x \leq 180^\circ$  or  $225^\circ \leq x \leq 270^\circ$  or  $315^\circ \leq x \leq 360^\circ$
- e. not given