OU MathDay 2001
TRIGONOMETRY TEST

1. Find $\cot\left(\frac{1}{2}\arcsin\left(-\frac{3}{5}\right)\right)$

   A. -3; **B.** 3; **C.** $\frac{1}{3}$; **D.** $-\frac{1}{3}$; **E.** none of these

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2. The amplitude of $y = 4\cos\left(\frac{3}{5}x - \frac{\pi}{3}\right)$ is:

   A. 4; **B.** $\frac{3}{5}$; **C.** $\frac{\pi}{3}$; **D.** $\frac{10\pi}{3}$; **E.** none of these

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3. If $1 + \tan^2 x = \csc^2 56°$, then x could be

   A. $56°$; **B.** $34°$; **C.** $28°$; **D.** $-56°$; **E.** none of these

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4. The expression $\sec^2 x + \sec x \tan x$ is identical to:

   A. $1 + \sin x$; **B.** $\sec^2 x + \tan^2 x$; **C.** $\frac{1}{1 - \sin x}$; **D.** $\sec^2 x$;

   E. none of these

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5. If $\sin\frac{3x}{5}\cos\frac{2x}{5} + \cos\frac{3x}{5}\sin\frac{2x}{5} = \frac{1}{2}$, then

   A. $\sin\frac{x}{5} = \frac{1}{2}$; **B.** $\cos x = \frac{1}{2}$; **C.** $\sin x = \frac{1}{2}$; **D.** $\cos\frac{x}{5} = \frac{1}{2}$;

   E. none of these

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6. $\tan\left(\frac{3\pi}{2} + A\right) =$

   A. $\tan A$; **B.** $\cot A$; **C.** $-\tan A$; **D.** $-\cot A$; **E.** none of these

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7. If the sides of a triangle are in the ratio 4:6:8, then the cosine of the smallest angle is:

   A. $\frac{1}{2}$; **B.** $\frac{7}{8}$; **C.** $\frac{11}{36}$; **D.** $-\frac{1}{6}$; **E.** none of these

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8. The sum of the solutions of $sin2x - cosx = 0$ in the interval $[0, 2\pi)$ is:

   A. $\frac{19\pi}{6}$; **B.** 4π; **C.** $\frac{5\pi}{2}$; **D.** $\frac{19\pi}{3}$; **E.** none of these

9. Which of the following identities is false?

   A. $\sin\theta\csc\theta = 1$; **B.** $\cos 2\theta = 1 - 2sin^2\theta$;

   C. $\dfrac{1}{1-\sin x} + \dfrac{1}{1+\sin x} = 2\sec^2 x$; **D.** $\sec^2 A + \csc^2 A = \sec^2 A \csc^2 A$;

   E. $\dfrac{\sin^3 B + \cos^3 B}{\sin B + \cos B} = 1 - \sin^2 B$

10. At a certain point on the horizontal with the foot of a flag pole, the angle of elevation of its top is 60°. If the point is 100 ft. from the foot of the flag pole, find the height of the flag pole (accurate to one decimal place).

    A. 57.7 ft.; **B.** 86.6 ft.; **C.** 50 ft.; **D.** 114 ft.; **E.** 173.2 ft.

11. The trigonometric (or polar) form of 2i is:

    A. $2\left(\cos\dfrac{\pi}{2} + i\sin\dfrac{\pi}{2}\right)$; **B.** $2(\cos\pi + \sin\pi)$; **C.** $2\left(\sin\dfrac{3\pi}{2} + i\cos\dfrac{3\pi}{2}\right)$;

    D. $-2(\cos\pi + i\sin\pi)$; **E.** none of these

12. If you are given the following information for triangle ABC, $m\angle B = 30°$, side $a = 30$, and side $b = 20$, then the triangle has:

    A. no solution; **B.** exactly one solution with $\sin A = \dfrac{3}{4}$;

    C. two solutions with $\sin A = \dfrac{3}{4}$; **D.** one solution with $\sin A = \dfrac{2}{3}$;

    E. none of these

13. On a circle of diameter 50 cm, what is the length, in cm, of the arc intercepted by a central angle of 150°?

    A. $\dfrac{125\pi}{3}$; **B.** $\dfrac{125\pi}{6}$; **C.** 3750; **D.** 1875; **E.** $\dfrac{30}{\pi}$

14. Solve for x: $\arctan\dfrac{1}{2}x + \arctan\dfrac{2}{3}x = \dfrac{\pi}{4}$

    A. $-\dfrac{3}{2}$, 2; **B.** $\dfrac{3}{2}$, -2; **C.** $\dfrac{-7 \pm \sqrt{97}}{4}$; **D.** $\dfrac{-7 + \sqrt{58}}{2}$;

    E. none of these

15. In triangle ABC, $m\angle A = 45°$, $m\angle B = 30°$, and side $c = 18$. Find the area of the triangle.

A. $18\sqrt{3} - 18$; **B.** $36\sqrt{3} - 36$; **C.** $81\sqrt{3} - 81$; **D.** $162\sqrt{3} - 162$;

E. none of these

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16. An ellipse has the polar equation $r^2 = \dfrac{144}{7\cos^2\theta + 9}$. Find length of the latus rectum.

A. 4.5; **B.** $\dfrac{32}{3}$; **C.** 5.5; **D.** $\dfrac{23}{3}$; **E.** none of these

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17. The distance between the points whose polar coordinates are $\left(7, \dfrac{\pi}{2}\right)$ and $\left(6, \dfrac{\pi}{6}\right)$ is:

A. $\sqrt{43}$; **B.** 43; **C.** $\sqrt{85}$; **D.** 85; **E.** none of these

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18. $\dfrac{\sin 100° - \sin 40°}{\cos 100° + \cos 40°} =$

A. $\tan 70°$; **B.** $\dfrac{\sqrt{3}}{3}$; **C.** $\sqrt{3}$; **D.** 1; **E.** none of these

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19. Given the right triangle ACD with right angle at D. B is a point on side AD between A and D. The length of segment AB is 1. If $m\angle DAC = \alpha$ and $m\angle DBC = \beta$, find the length of side DC.

A. $\dfrac{1}{\cot\alpha - \cot\beta}$; **B.** $\dfrac{1}{\tan\alpha - \tan\beta}$; **C.** $\dfrac{1}{\cot\beta - \cot\alpha}$;

D. $\dfrac{1}{\cot\alpha + \cot\beta}$; **E.** none of these

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20. Which of the following is equivalent to the function $f(x) = sin^4 x$?

A. $\dfrac{3 + 4\cos 2x + \cos 4x}{8}$; **B.** $\dfrac{3 - 4\cos 2x + \cos 4x}{8}$;

C. $\dfrac{3 - 4\cos 2x - \cos 4x}{8}$; **D.** $\dfrac{1 - 2\cos 3x + \cos 4x}{8}$; **E.** none of these

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1. Evaluate: $\csc\left(\sin^{-1}\frac{1}{2} - \cos^{-1}\frac{1}{2}\right)$

   A. -2; **B.** 2; **C.** $\frac{2\sqrt{3}}{3}$; **D.** $-\frac{2\sqrt{3}}{3}$; **E.** none of these

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2. Which of the following is not a fifth root of 1?

A. $\cos 72° + i \sin 72°$; **B.** $\cos 108° + i \sin 108°$; **C.** $\cos 144° + i \sin 144°$;

D. $\cos 216° + i \sin 216°$; **E.** $\cos 288° + i \sin 288°$.

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3. If the square of the length of a side of a rhombus is the product of the lengths of its diagonals, find the number of degrees in the acute angle between the sides.

   A. 15°; **B.** 30°; **C.** 45°; **D.** 60°; **E.** 75°