OU Math Day 2004

Trigonometry Test

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1. The degree measure of an angle is $56°$. What is its radian measure?

   (A) $\frac{14}{45}\pi$ (B) $\frac{45}{14\pi}$ (C) $\frac{14}{45\pi}$ (D) $\frac{45}{14}\pi$ (E) None of the above.

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2. If $-\pi/2 \leq \theta \leq 0$ and $\cos(\theta) = 1/3$ then what is the value of $\sin(\theta)$?

   (A) $2\sqrt{2}/3$ (B) $3/\sqrt{10}$ (C) $-2\sqrt{2}/3$ (D) $-1/3$ (E) None of the above.

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3. What is the value of $\cos(0°)$?

   (A) 0 (B) -1 (C) π (D) 1 (E) None of the above.

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4. How many angles θ satisfy the equation $\theta = \cos(\theta)$? (Use radian measure for θ.)

   (A) 0 (B) 1 (C) 2 (D) infinitely many (E) None of the above.

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5. If $\cot x = -\frac{2}{7}$ then $\tan x$ equals

   (A) $7/2$ (B) $-7/2$ (C) $3\sqrt{5}/7$ (D) $-3\sqrt{5}/7$ (E) None of the above.

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6. On a circle with a radius of 20 inches what is the length of an arc intercepted by a central angle of 110°?

   (A) $11\pi/9$ inches (B) $110\pi/9$ inches (C) $55\pi/9$ inches (D) $2200\pi^2/9$ inches (E) None of the above.

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7. The addition formula for cosine states that, for all angles A and B, $\cos(A+B)$ equals

   (A) $\cos(A)\cos(B)+\sin(A)\sin(B)$

   (B) $\cos(A)\cos(B)-\sin(A)\sin(B)$

   (C) $\cos(A)\sin(B)-\sin(A)\cos(B)$

   (D) $\cos(A)\sin(B)+\sin(A)\cos(B)$

   (E) None of the above.

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8. A right triangle has sides of length 3, 4 and 5. What is the cosine of the angle opposite the side with length 3?

   (A) $\frac{3}{4}$ (B) $\frac{4}{5}$ (C) $\frac{3}{5}$ (D) $\frac{1}{2}$ (E) None of the above.

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9. Using the fact that $\cos(\pi/6)=\sqrt{3}/2$ the value of $\cos(\pi/12)$ is

   (A) $\sqrt{3}/4$ (B) $1/2$ (C) $(2-\sqrt{3})/2$ (D) $\frac{\sqrt{2+\sqrt{3}}}{2}$ (E) None of the above.

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10. Find the sum of all of the solutions to the equation $\sin(2x)-\cos(x)=0$ in the interval $0\le x\le\pi/2$. (Use radian measure for x.)

    (A) $\frac{2\pi}{3}$ (B) $\frac{\pi}{2}$ (C) π (D) 0 (E) None of the above.

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11. A sine wave function $f(x) = a\sin(bx)$ has amplitude 100 and period 20. What are the values of a and b?

(A) $a = 10, b = 10/\pi$ (B) $a = 100, b = \pi/10$ (C) $a = 100, b = 10/\pi$
(D) $a = 10, b = \pi/10$ (E) None of the above.

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12. The numerical value for $\tan(30°) + \tan(60°)$ is

(A) 0 (B) 1 (C) -1 (D) $\frac{4}{3}\sqrt{3}$ (E) None of the above.

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13. If $\sec\theta$ is negative and $\sin\theta$ is positive, which quadrant does θ lie in?

(A) quadrant I (B) quadrant II (C) quadrant III
(D) quadrant IV (E) None of the above.

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14. In a right triangle the ratio of the lengths of the two non-hypotenuse legs is 20. Determine the sum of the cotangents of the angles of the triangle.

(A) $-\frac{20}{401}$ (B) $\frac{21}{\sqrt{401}}$ (C) $\frac{19}{\sqrt{401}}$ (D) $\frac{401}{20}$ (E) None of the above.

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15. An observer standing at the same level 100 feet from the base of a radio tower an angle of 60° between the horizontal and the line of sight of the top of the tower. How tall is the tower?

(A) $100\sqrt{3}$ feet (B) 50 feet (C) $100/\sqrt{3}$ feet (D) 200 feet (E) None of the above.

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16. Determine the value of $\sin^2(-x) + \cos(-x) - \sin^2(x)\cos(x)$ if you are given the information that $\cos(x) = 1/4$

(A) $-\frac{59}{64}$ (B) $\frac{61}{64}$ (C) $\frac{91}{64}$ (D) $\frac{59}{64}$ (E) None of the above.
