OU Math Day 2008

Trigonometry Test

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1. A right triangle has sides of length 5, 12 and 13. What is the cosine of the angle opposite the side of length 5?

   (A) 1 (B) $\frac{5}{12}$ (C) $\frac{5}{13}$ (D) $\frac{12}{13}$ (E) None of the above.

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2. A right triangle has sides of length 5, 12 and 13. What is the sine of the angle opposite the hypotenuse?

   (A) 1 (B) $\frac{5}{12}$ (C) $\frac{5}{13}$ (D) $\frac{12}{13}$ (E) None of the above.

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3. The expression $\sin\left(\frac{\pi}{2}+\theta\right)+\cos(\theta+\pi)$ simplifies to

   (A) $2\cos(\theta)$ (B) $-2\cos(\theta)$ (C) $\cos(\theta)+\sin(\theta)$ (D) 0 (E) None of the above.

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4. If $\cos(\theta)\sec(\theta)=1/2$ then what does θ equal?

   (A) 0 (B) 30° (C) 45° (D) 60° (E) None of the above

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5. Determine the value of $\cos(x)\sin^3(-x)+\cos^3(-x)\sin(x)$ given that x is an acute angle with $\cos(x)=1/3$.

   (A) $\frac{2\sqrt{2}}{9}$ (B) 0 (C) $-\frac{14\sqrt{2}}{81}$ (D) $-\frac{2\sqrt{2}}{9}$ (E) None of the above.

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6. If $\sin\theta = -1$ then which of the following is a possible value for θ?

(A) 0 (B) $\pi/6$ (C) $\pi/4$ (D) $-\pi/2$ (E) None of the above.

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7. Which of the following equals the cotangent of $0°$?

(A) 0 (B) 1 (C) $1/2$ (D) -1 (E) None of the above.

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8. How many angles θ whose degree measure is between 0 and 360 inclusive have $\tan(\theta) = -1$?

(A) 0 (B) 2 (C) 3 (D) 4 (E) None of the above.

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9. If $\arctan(x) = \pi/2$ then a possible value for x is

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

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10. Let T be a triangle with vertices A, B and C and side lengths $|AB| = 13$, $|AC| = 14$ and $|BC| = 15$. At which vertex is the interior angle of T the largest?

(A) vertex A (B) vertex B (C) vertex C (D) None of the above.

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11. If $\csc(x) = \sqrt{7}$ then which of the following does $\sec(x)$ equal?

(A) $\sqrt{7}/7$ (B) $6/7$ (C) $\sqrt{7}/\sqrt{6}$ (D) $\sqrt{7}$ (E) None of the above.

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12. A circle has a radius of 10 centimeters. Find the length, in centimeters, of the arc intercepted by a central angle of 100°.

(A) $50\pi/9$ (B) $100\pi/9$ (C) $500\pi/9$ (D) $18\pi/5$ (E) None of the above.

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13. If $0 < x < 90^\circ$ and $\sin(x) = 2/3$ then what does $\cos(x)$ equal?

(A) $3/2$ (B) $2/\sqrt{5}$ (C) $\sqrt{5}/3$ (D) $5/9$ (E) None of the above.

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14. The cotangent of an acute angle equals $1/2$. What is the sine of the angle?

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

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15. Suppose that $\tan\theta = -\frac{5}{3}$ and $\sec\theta = -\frac{\sqrt{34}}{3}$. What is $\csc\theta$?

(A) $\frac{5}{\sqrt{34}}$ (B) $-\frac{3}{\sqrt{34}}$ (C) $\frac{\sqrt{34}}{5}$ (D) $-\frac{3}{5}$ (E) None of the above.

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16. The side lengths of a right triangle are a, b and c where c is the side opposite the right angle. Which of the following equals the sum of the tangents of the angles opposite the edges with lengths a and b?

(A) $2a/b$ (B) c^2/ab (C) $(a+b)/c$ (D) 1 (E) None of the above

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17. If $\sin(\theta) = .1$ and $\frac{917}{2}\pi \leq \theta \leq \frac{919}{2}\pi$ then what does $\cos(\theta)$ equal?

(A) $-\frac{1}{\sqrt{99}}$ (B) $\frac{1}{\sqrt{99}}$ (C) $\sqrt{.99}$ (D) $-\sqrt{.99}$ (E) None of the above.

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18. A triangle Δ has vertices A, B and C. The length of the edge between B and C is 10, and the angles at A and B are 60° and 45° respectively. What is the radian measure of the angle at C?

(A) $5\pi/24$ (B) $5/24$ (C) $5\pi/12$ (D) $5/12$ (E) None of the above.

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19. A triangle Δ has vertices A, B and C. The length of the edge between B and C is 10, and the angles at A and B are 60° and 45° respectively. What is the area of Δ?

(A) $50\sqrt{3}/(1+\sqrt{3})$ (B) $10\sqrt{3}/(1+\sqrt{3})$ (C) $50/(3+3\sqrt{3})$ (D) $10/(3+3\sqrt{3})$ (E) None of the above.

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20. Determine the value of $\tan^2(\theta)$ given that $\sin(-\theta) = .3$.

(A) $\sqrt{.91}$ (B) $9/91$ (C) $.91$ (D) $-.91$ (E) None of the above.

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21. Which of the following equals $(\sin(x) + \cos(-x))^2 - \sin(2x)$?

(A) $1 + \sin(2x)$ (B) 1 (C) 0 (D) $1 - \sin(2x)$ (E) None of the above.

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22. If $\sin 2x = 4/5$ then what does $\tan^2(x)$ equal?

(A) $1/4$ (B) $16/9$ (C) $4/5$ (D) $\sqrt{5}/3$ (E) None of the above

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23. Let α be the angle between $\pi/2$ and π with $\sin(\alpha) = 1/3$, and let β be the angle between π and $3\pi/2$ with $\tan(\beta) = 4/3$. Then the value of $\cos(\alpha + \beta)$ is

(A) $\frac{6\sqrt{2}+4}{15}$ (B) $\frac{8\sqrt{2}-3}{15}$ (C) $\frac{-8\sqrt{2}-3}{15}$ (D) $\frac{6\sqrt{2}-4}{15}$ (E) None of the above.
