OU Math Day 2010

Trigonometry Test

(with answers on the last page)

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1. What is the value of $\cot(90°)$?

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

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2. What is the value of $\tan(90°)$?

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

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3. In which quadrant is the terminal side of the angle $2010°$?

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

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4. The addition formula for sine states, for all angles A and B, that $\sin(A+B)$ 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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5. If $\sin(x+45^\circ) - \cos(x+30^\circ)$ is written in the form $A\sin(x) + B\cos(x)$ then find $A - B$.

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

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6. If θ is an angle with $0^\circ < \theta < 90^\circ$ and $\cos\theta = \dfrac{a}{b}$ what is $\tan\theta$?

(A) $\dfrac{\sqrt{b^2-a^2}}{a}$ (B) $\dfrac{\sqrt{b^2-a^2}}{b}$ (C) $\dfrac{a}{\sqrt{b^2-a^2}}$ (D) $\dfrac{b}{\sqrt{b^2-a^2}}$ (E) None of the above.

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7. A triangle ΔPQR has side lengths $PQ = 4$ and $QR = 5$, and the angle at Q is 60°. Find the side length PR.

(A) $2\sqrt{3}$ (B) $\sqrt{15}$ (C) $3\sqrt{2}$ (D) $\sqrt{21}$ (E) None of the above.

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8. What is the degree measure equivalent of $\pi/32$ radians?

(A) $5^\circ\,37'\,30''$ (B) $5^\circ\,15'\,12''$ (C) $5^\circ\,6'\,25''$ (D) $5^\circ\,45'\,45''$ (E) None of the above.

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9. How many angles whose radian measure is between 0 and 2π inclusive have their tangent equal to -1?

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

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10. If x is an angle in the first quadrant and $\sin(x) = \dfrac{2}{7}$ then determine $\tan(2x)$.

(A) $\dfrac{6\sqrt{3}}{41}$ (B) $\dfrac{9\sqrt{5}}{41}$ (C) $\dfrac{12\sqrt{5}}{41}$ (D) $\dfrac{18\sqrt{3}}{41}$ (E) None of the above.

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11. Find the acute angle formed by the intersecting lines $y = x$ and $y = 2x$.

(A) $45°$ (B) $15°$ (C) $5°$ (D) $30°$ (E) None of the above.

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12. A clock tower casts a shadow 70 feet long when the angle of the sun (measured from the horizon) is $60°$. How many feet tall is the tower?

(A) $70\sqrt{3}$ (B) $210\sqrt{3}$ (C) 140 (D) $70/\sqrt{3}$ (E) None of the above.

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13. Determine the value of $\tan(45°)\cos(45°)\sin(45°)$.

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

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14. If $\sin(\alpha)$ and $\cot(\alpha)$ are both negative then which quadrant does α lie in?

(A) I (B) II (C) III (D) IV (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 $\sin\theta$?

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

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16. Simplify the expression $\dfrac{\cot(x)\cos^2(x)\sec(x)}{\csc^3(x)\tan(x)\sin(x)}$.

(A) $\tan(x)$ (B) $\sin^2(x)$ (C) $\sin^4(x)$ (D) $\cos^3(x)$ (E) None of the above.

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17. Find $\cos(17\pi/6)$.

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

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18. Let

$$\cos(4x) = A\cos^4(x) + B\cos^3(x) + C\cos^2(x) + D\cos(x) + E.$$

Compute $A + B + C + D + E$.

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

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19. Find all angles θ with $0^\circ \le \theta \le 360^\circ$ that satisfy $\cos^2\theta + \dfrac{1}{2}\sin\theta - \dfrac{1}{2} = 0$.

(A) $\{210^\circ, 330^\circ\}$ (B) $\{90^\circ, 210^\circ, 330^\circ\}$ (C) $\{90^\circ, 240^\circ, 300^\circ\}$
(D) $\{90^\circ, 210^\circ, 270^\circ, 330^\circ\}$ (E) None of the above.

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20. Which of the equations below is **not** a trig identity.

(A) $\tan^2 x - \cot^2 x = \sec^2 x - \csc^2 x$ (B) $(\sin x + \cos x)(\sec x + \csc x) - \cot x - 2 = \sin x$
(C) $\dfrac{\sec x}{\tan x} = \dfrac{\tan x}{\sec x - \cos x}$ (D) $\cot x = \dfrac{\csc x}{\sec x}$ (E) None of the above.

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21. Find $\cos\left(\arctan\left(\csc\left(\arcsin\left(\tan\left(\arccos\left(\dfrac{-\sqrt{2}}{2}\right)\right)\right)\right)\right)\right)$.

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

ANSWERS:

1. C
2. E
3. C
4. D
5. C
6. A
7. D
8. A
9. B
10. C
11. B
12. A
13. C
14. D
15. B
16. D
17. A
18. C
19. B
20. B
21. A