OU Math Day 2005

# Trigonometry Test

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1. If $\csc(x) = \dfrac{1}{\sqrt{7}}$ then $\sec(x)$ equals

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

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2. 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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3. What is the value of $\tan(45°)$?

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

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4. 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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5. If $\tan\theta$ is positive and $\sec\theta$ is negative, which quadrant does $\theta$ lie in?

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

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6. Find the sum of all of the solutions to the equation $\cos(2x) - \sin^2(x) - 1 = 0$ in the interval $0 \leq x \leq 5\pi$. (Use radian measure for $x$.)

(A) $15\pi$ (B) $0$ (C) $\pi$ (D) $10\pi$ (E) None of the above.

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7. What is the cotangent of $0°$?

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

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8. Determine the value of $\cos(\theta)$ given that $\cos(\pi - \theta) = .2$

(A) $\sqrt{.96}$ (B) $.2$ (C) $-.2$ (D) $-\sqrt{.96}$ (E) None of the above.

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9. The hypotenuse of a right triangle has length 8 and one of the other edges has length 3. What is the sine of the angle opposite the edge of length 3?

(A) $3/\sqrt{55}$ (B) $3/8$ (C) $\sqrt{55}/8$ (D) $55/64$ (E) None of the above.

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10. The hypotenuse of a right triangle has length 8 and one of the other edges has length 3. What is the tangent of the angle opposite the edge of length 3?

(A) $3/\sqrt{55}$ (B) $3/8$ (C) $\sqrt{55}/8$ (D) $55/64$ (E) None of the above.

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

(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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12. A tree casts a shadow 50 yards long when the angle of the sun (measured from the horizon) is 30°. How tall is the tree in feet?

(A) $150\sqrt{3}$ (B) $50\sqrt{3}$ (C) 150 (D) $75\sqrt{3}$ (E) None of the above.

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13. The difference 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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14. The degree measure of an angle $\theta$ is between 0° and 180°. If the cosine of $\theta$ equals 1/2 what does $\theta$ equal?

(A) 60° (B) 45° (C) either 60° or 120° (D) either 30° or 150°
(E) None of the above.

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15. How many angles $\theta$ satisfy the equation $\theta = \tan(\theta)$? (Use radian measure for $\theta$.)

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

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16. What is the radian measure of a right angle?

(A) $\pi/2$ (B) 0 (C) $\pi$ (D) 90 (E) None of the above.

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17. Find the numerical value of $\cos(60°) + \cot(30°)$:

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

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18. A triangle $T$ has vertices $P$, $Q$ and $R$. The length of the edge between $P$ and $Q$ is 10, and the angles at $P$ and $Q$ are 60° and 45° respectively. What is the radian measure of the angle at $R$?

(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 $T$ has vertices $P$, $Q$ and $R$. The length of the edge between $P$ and $Q$ is 10, and the angles at $P$ and $Q$ are 60° and 45° respectively. What is the area of $T$?

(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. A sine wave function $f(x) = a\sin(bx)$ has amplitude 10 and period 40. What are the values of $a$ and $b$?

(A) $a = 10$ and $b = 20/\pi$ (B) $a = 10$ and $b = 1/40$ (C) $a = 10$ and $b = \pi/20$
(D) $a = 10$ and $b = 40$ (E) None of the above.

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21. How many solutions does the equation $\cos(x) + \cos(-x) = 0$ have if $0 \leq x \leq 2\pi$? (Radian measure is assumed for $x$.)

(A) infinitely many (B) 1 (C) 2 (D) 3 (E) None of the above.

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22. In a right triangle the hypotenuse has length 10 and the the sum of the cotangents of all three angles of the triangle equals 2. What are the lengths of the other two sides of the triangle?

(A) 5 and $5\sqrt{3}$ (B) $5\sqrt{2}$ and $5\sqrt{2}$ (C) 1 and $3\sqrt{11}$ (D) 4 and $2\sqrt{21}$
(E) None of the above.

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23. The tangent 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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24. Let $\theta$ be an angle whose radian measure is between $5\pi/2$ and $7\pi/2$. If $\sin(\theta) = 3/5$ then what is the value of $\cos(\theta)$?

(A) 4/5 (B) 16/5 (C) 16/25 (D) $-4/5$ (E) None of the above.

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