OU Math Day 2017

Trigonometry Test

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1. A building casts a shadow 50 yards long when the angle of the sun (measured from the horizon) is $30°$. How tall is the building 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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2. What is the radian measure of a right angle?

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

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3. What is the value of $\tan(\pi/4)$?

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

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4. How many angles x having degree measure between 0 and 2017 satisfy $\sin(x) = -.1$?

   (A) 10 (B) 4034 (C) 11 (D) 6 (E) None of the above

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5. 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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6. Find the numerical value of $\cos(60^\circ) + \cot(30^\circ)$:

(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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7. 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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8. 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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9. If $\theta = 2017\pi/4$ then $\sin(2\theta) + 2\cos(\theta)$ equals:

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

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

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

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11. 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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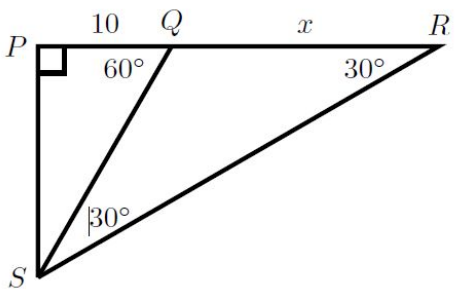
12. In the right triangle PRS shown below, PQ has length 10 and various angles have degree measures as indicated. Determine the length of QR.

(A) $10\sqrt{3}$ (B) 20 (C) 50/3 (D) $20/\sqrt{3}$ (E) None of the above



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13. 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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14. 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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15. 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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16. How many angles θ satisfy the equation $\theta = \tan(\theta)$? (Use radian measure for θ.)

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

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17. If $\tan\theta$ is positive and $\sec\theta$ is negative, 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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18. The expression $\sin(-x)\tan(x)$ equals which of the following?

(A) $\dfrac{\sin(x)-\tan(x)}{\csc(x)-\cot(x)}$ (B) $\dfrac{\sin(x)+\cos(x)}{\tan(x)}$ (C) $\dfrac{1}{\cos(x)-\sin(x)}$

(D) $\dfrac{\tan(x-\pi)}{\sin(x)-\cos(x)}$ (E) None of the above

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19. How many solutions with $0 \le \theta \le 2\pi$ does the equation $\sin^4(\theta)-\cos^4(\theta)=0$ have?

(A) 0 (B) 1 (C) 2 (D) 3 (E) None of the above

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20. 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.

Answers for the 2017 Trigonometry Test:

1-4:	BADC
5:	(ABCDE)
6-10:	CACAC
11-15:	ABDCA
16-20:	DCAEB
