Math Relays 2017

Trigonometry

No calculators allowed on this test

Shade the letter of the correct answer on the answer sheet.

In 1-4, in the triangle with $5-12-13$ sides and the smallest side opposite the angle α, find the value of:

(a) 2.6 , (b) 2.4, (c) $\frac{12}{13}$ (d) $\frac{5}{12}$, (e) none of these

1. $\csc\alpha$

2. $\tan\alpha$

3. $\cos\alpha$

4. $\cot\alpha$

In 5-8, the point P is situated in quadrant:

(a) I, (b) II, (c) III (d) IV, (e) none of these

5. $P(\frac{1-\sqrt{2}}{1+\sqrt{3}}, \sqrt{2})$

6. $P((-2)^{2017}, \frac{1}{\pi-4})$

7. $P(2^{-3}, \sqrt{(-2016)^2}$

8. $P(\sqrt{13}-\sqrt{11}, \sqrt{10}-\sqrt{11})$

In 9-12, choose your answer from the following that simplifies the expression:

(a) $\cot^2 x - \tan^2 x$, (b) $\tan^2 x$, (c) $\csc x$, (d) $\tan^2 x + \sec^2 x$, (e) none of these

9. $\sec(x-\frac{\pi}{2}) =$

10. $\sec^4 x - \tan^4 x =$

11. $\csc^2 x - \sec^2 x =$

12. $\frac{1}{(\csc x-1)(\csc x+1)} =$

In 13-16, determine the period of:

(a) π , (b) $\pi/2$, (c) 2π, (d) $1/2$, (e) none of these

13. $y = 2\cos^2(x - \pi) - 1$

14. $y = |\sin(2\pi x - \frac{\pi}{2})|$

15. $y = \tan 2x + \cot 2x$

16. $y = \cos(x - 4^{10}\pi)$

In 17-20, pick the number of solutions of the equation:

(a) four, (b) three, (c) infinitely many, (d) none, (e) none of these

17. $2\csc x = \sin x$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$

18. $\csc^2 x - \cot^2 x = 1$ for $0 < x < 3\pi$

19. $|\cot x| = 2017$ for $-\pi < x < 3\pi$

20. $\sin x = \tan x$ for $\pi \geq x \leq \pi$

In 21-24, compute and choose your answer from the following:

(a) 0, (b) $\frac{3}{4}$, (c) -1, (d) 1, (e) none of these

21. $\sin 15^o \cos 15^o \tan 15^o \cot 15^o \csc 15^o \sec 15^o =$

22. $\left[(\cos 15^o - \sin 15^o)(\cos 15^o + \sin 15^o)\right]^2 =$

23. $\left[\tan(2017\pi - \frac{\pi}{4})\right]^{2017} =$

24. $\cot(\sin^{-1}\frac{12}{13} + \cos^{-1}\frac{5}{13}) =$