The Weekly Rigor

No. 271 "A mathematician is a machine for turning coffee into theorems." August 31, 2019

28 Problems Solving Simple Trigonometric Equations (Type III)

(Part 1)

Type III Equations: Involving tangent or cotangent.

PROBLEMS

Solve for θ over the interval $[0,2\pi)$. Show (write out) the use of reference angles and the reference triangles to determine the solution(s), except in cases where θ is a quadrant angle (0, $\frac{\pi}{2}$, π, and $\frac{3\pi}{2}$).

1. $3\tan(\theta) - \sqrt{3} = 0$
2. $\sqrt{3}\tan(\theta) - 1 = 0$
3. $\cot(\theta) - \sqrt{3} = 0$
4. $\sqrt{3}\cot(\theta) - 3 = 0$
5. $3\tan(\theta) + \sqrt{3} = 0$
6. $\sqrt{3}\tan(\theta) + 1 = 0$
7. $\cot(\theta) + \sqrt{3} = 0$
8. $\sqrt{3}\cot(\theta) + 3 = 0$
9. $3\tan^2(\theta) - 1 = 0$
10. $\cot^2(\theta) - 3 = 0$
11. $\tan(\theta) - \sqrt{3} = 0$
12. $\sqrt{3}\tan(\theta) - 3 = 0$
13. $3\cot(\theta) - \sqrt{3} = 0$
14. $\sqrt{3}\cot(\theta) - 1 = 0$
15. $\tan(\theta) + \sqrt{3} = 0$
16. $\sqrt{3}\tan(\theta) + 3 = 0$

17. $3\cot(\theta)+\sqrt{3}=0$

18. $\sqrt{3}\cot(\theta)+1=0$

19. $\tan^2(\theta)-3=0$

20. $3\cot^2(\theta)-1=0$

21. $\tan(\theta)-1=0$

22. $\cot(\theta)-1=0$

23. $\tan(\theta)+1=0$

24. $\cot(\theta)+1=0$

25. $\tan^2(\theta)-1=0$

26. $\cot^2(\theta)-3=0$

27. $\tan(\theta)=0$

28. $\cot(\theta)=0$

ANSWERS

1. $\frac{\pi}{6},\frac{7\pi}{6}$	2. $\frac{\pi}{6},\frac{7\pi}{6}$	3. $\frac{\pi}{6},\frac{7\pi}{6}$	4. $\frac{\pi}{6},\frac{7\pi}{6}$
5. $\frac{5\pi}{6},\frac{11\pi}{6}$	6. $\frac{5\pi}{6},\frac{11\pi}{6}$	7. $\frac{5\pi}{6},\frac{11\pi}{6}$	8. $\frac{5\pi}{6},\frac{11\pi}{6}$
9. $\frac{\pi}{6},\frac{5\pi}{6},\frac{7\pi}{6},\frac{11\pi}{6}$	10. $\frac{\pi}{6},\frac{5\pi}{6},\frac{7\pi}{6},\frac{11\pi}{6}$	11. $\frac{\pi}{3},\frac{4\pi}{3}$	12. $\frac{\pi}{3},\frac{4\pi}{3}$
13. $\frac{\pi}{3},\frac{4\pi}{3}$	14. $\frac{\pi}{3},\frac{4\pi}{3}$	15. $\frac{2\pi}{3},\frac{5\pi}{3}$	16. $\frac{2\pi}{3},\frac{5\pi}{3}$
17. $\frac{2\pi}{3},\frac{5\pi}{3}$	18. $\frac{2\pi}{3},\frac{5\pi}{3}$	19. $\frac{\pi}{3},\frac{2\pi}{3},\frac{4\pi}{3},\frac{5\pi}{3}$	20. $\frac{\pi}{3},\frac{2\pi}{3},\frac{4\pi}{3},\frac{5\pi}{3}$
21. $\frac{\pi}{4},\frac{5\pi}{4}$	22. $\frac{\pi}{4},\frac{5\pi}{4}$	23. $\frac{3\pi}{4},\frac{7\pi}{4}$	24. $\frac{3\pi}{4},\frac{7\pi}{4}$
25. $\frac{\pi}{4},\frac{3\pi}{4},\frac{5\pi}{4},\frac{7\pi}{4}$	26. $\frac{\pi}{6},\frac{5\pi}{6},\frac{7\pi}{6},\frac{11\pi}{6}$	27. $0,\pi$	28. $\frac{\pi}{2},\frac{3\pi}{2}$