

Pre - Calculus
Mathematics 40S



STANDARDS TEST PRACTICE EXAM

TRIGONOMETRY II

1. If $\cos \alpha = -\frac{2}{5}$, where $\sin \alpha > 0$, and $\sin \beta = \frac{4}{9}$, where $\tan \beta > 0$, determine the exact value of $\cos(\alpha + \beta)$

2. Express $1 - \sin^2(\alpha + \beta)$ using only cosine.

3. If $\cos 3\theta = \frac{\sqrt{3}}{2}$, where 3θ is an *acute* angle, determine the exact value of θ

4. Determine the exact value of $\tan(15^\circ)$

5. Prove the identity: $\frac{1 - \cot^2 x}{1 + \cot^2 x} = \sin^2 x - \cos^2 x$

6. Solve for x , where $0 \leq x \leq 2\pi$: $\csc^2 x - \csc x = 2$

7. Solve for x : $2 \cos^2 x + \cos x - 1 = 0$

8. Simplify: $\frac{\sin x \cot x + \cos x}{\sin x}$

9. Solve $(2 \cos \theta + 1)(\tan \theta - 1) = 0$ for θ in the interval $\frac{\pi}{2} \leq x \leq 2\pi$

10. Determine the exact value of

a) $\cos \frac{11\pi}{12}$

b) $\sec \frac{11\pi}{12}$

11. Prove the identity $\frac{\cot \theta \sec^2 \theta}{\cot^2 \theta + 1} = \tan \theta$

12. If $\tan \theta = -\frac{3}{2}$ and $\frac{3\pi}{2} < \theta < 2\pi$, state the exact value of $\cos 2\theta$

13. Solve for θ over $[0, 2\pi]$: $\sin 2\theta = \frac{\sqrt{3}}{2}$

14. Solve the following equation for $x \in R$: $2 \cos 2\theta + 1 = 0$

15. If α and β are second quadrant angles, and $\cos \alpha = -\frac{2}{3}$ and $\sin \beta = \frac{1}{4}$, determine the exact value of $\sin(\alpha - \beta)$

16. Solve for x over the interval $[0, 2\pi]$ for $\sin^2 x = \sin x$

17. Prove $\frac{1}{1+\cos\theta} + \frac{1}{1-\cos\theta} = 2\csc\theta$

18. Solve for x over the interval $[0, 2\pi]$: $1 + \tan^2 x = 3$.

19.

a) Prove $\frac{\sin 2x}{1 + \cos 2x} = \tan x$

b) State a value of x where $\frac{\sin 2x}{1 + \cos 2x}$ is undefined

20. Find the exact value of $2 \cos^2 \left(\frac{\pi}{8} \right) - 1$

21. Simplify $\frac{\left(\sin x + \frac{\cos^2 x}{\sin x}\right)}{\csc x}$

22. Find the exact value of:

a) $\cos\left(\frac{7\pi}{12}\right)$

b) $\sec\left(\frac{7\pi}{12}\right)$

23. Express $\tan^2 \theta$ using only $\sin \theta$

24. Prove: $\frac{\cos x}{\sin x + 1} + \frac{\sin x + 1}{\cos x} = 2 \sec x$

25. Solve for θ in the interval $[0, 2\pi]$: $2 \sin^2 \theta - 3 \sin \theta + 1 = 0$

26. If $\cos \theta = -\frac{4}{5}$ and $\csc \theta > 0$, determine the exact value of:

a) $\tan 2\theta$

b) $\sin 2\theta$

27. Solve the equation $\csc \theta = -3$, where $\theta \in R$. State your solution to three decimal places.

28. Show that $\sin 8x$ is equivalent to $2 \sin 4x \cos 4x$

29. Express $\cot \theta \sec \theta$ as a single trigonometric function

30. If $\sin \theta = \frac{12}{13}$ and $\cos \theta < 0$, find the exact value of

a) $\tan \theta$

b) $\cos\left(\theta - \frac{\pi}{4}\right)$

31. Find the exact values of x in the interval $[0, 2\pi]$: $\cos^2 x + \cos x + 1 = \sin^2 x$

32. Prove the identity: $\frac{\cos x - \cos^3 x}{\sin^3 x} = \cot x$

33. Given the point shown on the circle, determine the value of $\tan 2\beta$

