

**Class XI Maths Assignment Chapter 3 (Trigonometric Functions)**

1. If  $\tan x = k$ , find the value of :  $\frac{\sin x}{\cos^3 x} + \frac{\cos x}{\sin^3 x}$
2. Prove that  $\cos^2 x + \cos^2(\frac{\pi}{2}+x) - \cos x \cos(\frac{\pi}{2}+x)$  is independent of  $x$ .
3. If  $\sin \theta = 3 \sin(\theta + 2\alpha)$  then prove that  $\tan(\theta + \alpha) + 2 \tan \alpha = 0$
4. Solve the following equations:
  - (i)  $\sin x = \sin 5x$
  - (ii)  $\sec x \cos 5x + 1 = 0$  for  $0 < x < \frac{\pi}{2}$ .
  - (iii)  $5 \cos^2 x + 7 \sin^2 x - 6 = 0$ .
  - (iv)  $\tan x + \tan 2x + \sqrt{3} \tan x \tan 2x = \sqrt{3}$
  - (v)  $2 \sin^2 x = 3 \cos x$ .
5. Prove the following:
  - (i)  $\tan x + \tan(\frac{\pi}{3}+x) + \tan(\frac{2\pi}{3}+x) = 3 \tan 3x$
  - (ii)  $\sin 5x = 5 \sin x - 20 \sin^3 x + 16 \sin^5 x$ .
  - (iii)  $\cos^3 x + \cos^3(\frac{\pi}{3}+x) + \cos^3(\frac{2\pi}{3}-x) = \frac{3}{4} \cos 3x$ .
  - (iv)  $\frac{\cos x}{1-\sin x} = \tan(\frac{\pi}{4} + \frac{x}{2})$
6. If  $\tan \frac{x}{2} = \frac{m}{n}$ . prove that  $m \sin x + n \cos x = n$
7. If  $\sin x + \sin y = a$  and  $\cos x + \cos y = b$  then find
  - (i)  $\sin(x+y)$
  - (ii)  $\cos(x+y)$
8. If  $a+b = \pi/2$ , then find the minimum and maximum value of  $\sin a \sin b$ .
9. If  $\frac{\sin x}{a} = \frac{\cos x}{b}$  then prove that  $a \sin 2x + b \cos 2x = b$
10. If  $2 \cos y = x + \frac{1}{x}$  then prove that  $\cos 3y = \frac{1}{2}(x^3 + \frac{1}{x^3})$