

**SNS ACADEMY**

**WORKSHEET**

**Class XI**

Name :

Date:13.9.13

Q1 Prove by the principle of mathematical induction, that for all  $n \in \mathbb{N}$

- a)  $1+4+7+\dots+(3n-2) = \frac{n(3n-1)}{2}$
- b)  $1^3+2^3+3^3+\dots+n^3 = \left(\frac{n(n+1)}{2}\right)^2$
- c)  $1 + \frac{1}{(1+2)} + \frac{1}{(1+2+3)} + \dots + \frac{1}{(1+2+3+\dots+n)} = \frac{2n}{(n+1)}$ , for all  $n \in \mathbb{N}$
- d)  $\frac{1}{(1.3)} + \frac{1}{(3.5)} + \frac{1}{(5.7)} + \dots + \frac{1}{((2n-1)(2n+1))} = \frac{n}{(2n+1)}$
- e)  $7^n - 3^n$  is divisible by 4.
- f)  $(1+x)^n \geq 1+nx$  whenever  $x$  is +ve and  $n$  is a +ve integer.
- g)  $4^n + 15n - 1$  is divisible by 9, for  $n \in \mathbb{N}$ .

Q2. Prove that  $(\cos 8A \cos 5A - \cos 12A \cos 9A) / (\sin 8A \cos 5A + \cos 12A \sin 9A) = \tan 4A$ .

Q3. Prove that  $\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$

Q4. If  $A=\{1,2,5\}$ ,  $B=\{1,2,3,4\}$  and  $C=\{5,6,2\}$ , Verify that

a)  $A \times (B \cap C) = (A \times B) \cap (A \times C)$

b)  $(A-B) \times C = (A \times C) - (B \times C)$

Q6. What is the value of  $\cos(\pi/4 - x) \cos(\pi/4 - y) - \sin(\pi/4 - x) \sin(\pi/4 - y)$

Q7. What is the eccentricity of the curve  $4x^2 + y^2 = 100$ .

Q8. What is the value of  $\cot((-15\pi)/4)$

Q9. Find  $\sin x/2$ ,  $\cos x/2$  and  $\tan x/2$  if  $\tan x = -4/3$ ,  $x$  in quadrant II

Q10. Find the square root of  $-7 - 24i$

Q11. Prove that  $\cos^2 x + \cos^2(x + \pi/3) + \cos^2(x - \pi/3) = 3/2$

Q12. Show that  $(A \cup B)' = A' \cap B'$  and  $(A \cap B)' = A' \cup B'$

Where  $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ ,  $A = \{2, 3, 4\}$  and  $B = \{3, 4, 5\}$