

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 $\cot((-15^\circ)/4)$

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 $B = \{3, 4, 5\}$