Nishant Jindal

HW 2

Q 4 (copy)

$a^3 \pm b^3$

$\sin^3\theta + \sin\theta\cdot\cos\theta + \cos^3\theta - 1 = 0$

$(\sin\theta+\cos\theta)(\sin^2\theta+\cos^2\theta-\sin\theta\cos\theta) - (1-\sin\theta\cdot\cos\theta) = 0$

$(\sin\theta+\cos\theta)(1-\sin\theta\cos\theta) - (1-\sin\theta\cdot\cos\theta) = 0$

$(1-\sin\theta\cdot\cos\theta)\{\sin\theta+\cos\theta-1\} = 0$

$\sin\theta\cdot\cos\theta - 1 = 0$

$\sin\theta\cdot\cos\theta = 1$

$2\sin\theta\cdot\cos\theta = 2$

$\boxed{\sin 2\theta} = 2$

$[-1,1]$ X Not Possible

$\sin\theta + \cos\theta = 1$

$\theta = 2n\pi \pm \cos^{-1}\frac{1}{\sqrt{2}} + \tan^{-1}\frac{1}{1}$

$\theta = 2n\pi \pm \frac{\pi}{4} + \frac{\pi}{4}$

2θ
3θ
Basic
Sum+
sinC+sinD
Prod → Sum

Q3 (copy) Pract

$\sin 2\theta + \cos 2\theta + \sin\theta + \cos\theta + 1 = 0$

$(\sin\theta+\cos\theta) + (1+\sin 2\theta) + \cos 2\theta = 0$

$(\sin\theta+\cos\theta) + (\sin\theta+\cos\theta)^2 + (\cos^2\theta - \sin^2\theta) = 0$

$(\sin\theta+\cos\theta)\{1 + (\sin\cancel{\theta}+\cos\theta) + (\cos\theta - \sin\cancel{\theta})\} = 0$

$(\sin\theta+\cos\theta)(1+2\cos\theta) = 0$

$\Rightarrow \sin\theta+\cos\theta = 0$ OR $2\cos\theta + 1 = 0$

$\sin\theta = -\cos\theta$

$\tan\theta = -1$

$\tan\theta = \tan\left(-\frac{\pi}{4}\right)$

$\theta = n\pi - \frac{\pi}{4}$

$\cos\theta = -\frac{1}{2} = \cos\frac{2\pi}{3}$

$\boxed{\theta = 2n\pi \pm \frac{2\pi}{3}}$

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Q13

Copy

$a\cos\theta + b\sin\theta \to A.A. = \sqrt{1^2+\sqrt{3}^2} = 2.$

$\cos\theta + \sqrt{3}\sin\theta = 2\cos 2\theta$

$\frac{1}{2}\cos\theta + \frac{\sqrt{3}}{2}\sin\theta = \cos 2\theta$

$\cos\frac{\pi}{3}.\cos\theta + \sin\theta.\sin\frac{\pi}{3} = \cos 2\theta.$

$\cos\left(\theta - \frac{\pi}{3}\right) = \cos 2\theta \to \boxed{\cos\theta = \cos\alpha}$

$2\theta = 2n\pi \pm \left(\theta - \frac{\pi}{3}\right)$

(+) | −

$2\theta = 2n\pi + \left(\theta - \frac{\pi}{3}\right)$

$\boxed{\theta = 2n\pi - \frac{\pi}{3}}$

$2\theta = 2n\pi - \left(\theta - \frac{\pi}{3}\right)$

$3\theta = 2n\pi + \frac{\pi}{3}.$

$\boxed{\theta = \frac{2n\pi}{3} + \frac{\pi}{9}}$

Q14

Copy

$\sqrt{3}(\cos\theta - \sqrt{3}\sin\theta) = 4\sin 2\theta.\cos 3\theta \to$ [Prod = Sum]

$\sqrt{3}\cos\theta - 3\sin\theta = 2[\sin(5\theta) + \sin(-\theta)]$

$\sqrt{3}\cos\theta - 3\sin\theta = 2\sin 5\theta - 2\sin\theta$

$\sqrt{3}\cos\theta - \sin\theta = 2\sin 5\theta$

$a\cos\theta + b\sin\theta$

$A.A. = \sqrt{\sqrt{3}^2 + 1^2} = 2$

$\frac{\sqrt{3}}{2}\cos\theta - \frac{1}{2}\sin\theta = \sin 5\theta$

$\sin\frac{\pi}{3}\cos\theta - \cos\frac{\pi}{3}\sin\theta = \sin 5\theta$

$\sin\left(\frac{\pi}{3} - \theta\right) = \sin 5\theta \to \sin\theta = \sin\alpha.$

$5\theta = n\pi + (-1)^n\left(\frac{\pi}{3} - \theta\right) \xrightarrow{n=2K} \theta = \frac{2K\pi}{5} + \left(\frac{\pi}{15} - \frac{2K}{5}\right)$

$= \frac{2K}{5}(\pi - 1) + \frac{\pi}{15}$

$\theta = \frac{n\pi}{5} + (-1)^n\left(\frac{\pi}{15} - \frac{\theta}{5}\right)$

$\theta = \frac{(2K+1)\pi}{5} - \frac{\pi}{15} + \frac{\theta}{5}$ | $n = 2K+1$

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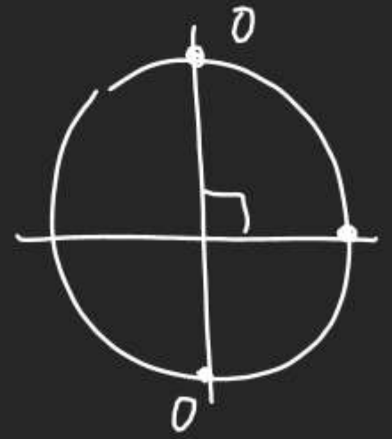
I5 Transforming Sum into Prod.

Q $\cos 3x + (\sin 2x - \sin 4x) = 0$

$\sin 2x - \sin 4x \longrightarrow$ Sum/diff = Prod.

$\Rightarrow \cos 3x + 2\cos(3x)\cdot\sin(-x) = 0$

$\Rightarrow \cos 3x\{1 - 2\sin x\} = 0$



$\cos 3x = 0$ OR $\sin x = \frac{1}{2} = \sin\frac{\pi}{6}$

$3x = (2n+1)\frac{\pi}{2}$ OR. $x = n\pi + (-1)^n\frac{\pi}{6}$.

$x = (2n+1)\frac{\pi}{6}$

$x = \frac{n\pi}{3} + \frac{\pi}{6}$

$\boxed{\begin{array}{l}\sin x = 0 \\ x = n\pi\end{array}}$

Q Find G.S. of eqn.

$\sin x + \sin 5x = \sin 2x + \sin 4x$ is

A) $\frac{n\pi}{3}$ B) $\frac{2n\pi}{3}$ C) $2n\pi$ D) $n\pi$

$\cancel{2}\sin(3x)\cdot\cos(-2x) = \cancel{2}\sin(3x)\cos(-x)$

$\sin 3x\{\cos 2x - \cos x\} = 0 \longrightarrow$ Sum/diff.

$-\sin 3x \times 2\sin\left(\frac{3x}{2}\right)\cdot\sin\left(\frac{x}{2}\right) = 0$

$\underset{=0}{\sin 3x} \cdot \underset{=0}{\sin\left(\frac{3x}{2}\right)} \cdot \underset{=0}{\sin\left(\frac{x}{2}\right)} = 0$

$\cup$ $\cup$

$3x = n\pi$

$\boxed{x = \frac{n\pi}{3}}$

$\left(0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}, 2\pi, \frac{7\pi}{3} \ldots\right)$

$\frac{3x}{2} = n\pi$

$x = \frac{2n\pi}{3}$

$\left(0, \frac{2\pi}{3}, \frac{4\pi}{3}, 2\pi, \frac{8\pi}{3} \ldots\right)$

$\frac{x}{2} = n\pi$

$x = 2n\pi \rightarrow (0, 2\pi, 4\pi \ldots)$

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Q G.S. of

$$\underbrace{\sin x - 3\sin 2x + \sin 3x}_{\sin C + \sin D} = \underbrace{\cos x - 3\cos 2x + \cos 3x}_{(\cos C + \cos D)} \text{ is}$$

$$2\sin(2x)\cdot\cos(x) - 3\sin 2x = 2\cos(2x)\cos(x) - 3\cos 2x$$

$$\sin 2x\{2\cos x - 3\} = \cos 2x(2\cos x - 3)$$

$$\sin 2x(2\cos x - 3) - \cos 2x(2\cos x - 3) = 0$$

$$(2\cos x - 3)(\sin 2x - \cos 2x) = 0$$

$2\cos x - 3 = 0$

$\cos x = \frac{3}{2} = 1.5$ ✗

$\sin 2x - \cos 2x = 0$

$$\sin 2x = \cos 2x$$

$$\tan 2x = 1 = \tan\frac{\pi}{4}$$

$$2x = n\pi + \frac{\pi}{4}$$

$$\boxed{x = \frac{n\pi}{2} + \frac{\pi}{8}}$$

Q If $\tan(p\theta) = \tan(q\theta)$ then θ is in AP, G.P, HP ....

$\tan\theta = \tan\alpha \Rightarrow \theta = n\pi + \alpha$.

$$p\theta = n\pi + q\theta$$

$$(p\theta - q\theta) = n\pi$$

$$\theta = \frac{n\pi}{p-q}$$

$$\theta = 0, \frac{\pi}{p-q}, \frac{2\pi}{p-q}, \frac{3\pi}{p-q} \dots$$

differences: $\frac{\pi}{p-q}$, $\frac{\pi}{p-q}$

AP

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Q The sum of all Sol. of trig Eqn.

$\sin \pi x + \cos \pi x = 0$ in $[0, 100]$ is

5025   5026   5027   5028.

$\star\ 1+2+3+\dots+n$

$= \frac{(n)(n+1)}{2}$

$\sin \pi x = -\cos \pi x$

$\tan \pi x = -1$

$\tan \pi x = \tan\left(-\frac{\pi}{4}\right)$

$\pi x = n\pi - \frac{\pi}{4}$

$x = \left(n - \frac{1}{4}\right)\ n \in I$

Sum

$= \left(1-\frac{1}{4}\right)+\left(2-\frac{1}{4}\right)+\left(3-\frac{1}{4}\right)\dots+\left(100-\frac{1}{4}\right)$

$= (1+2+3+\dots 100) - 100 \times \frac{1}{4}$

$= \frac{\cancel{100}^{50} \times 101}{\cancel{2}} - \frac{\cancel{100}^{25}}{\cancel{4}}$

$= 5050 - 25 = 5025$

$0 - \frac{1}{4},\ 1-\frac{1}{4},\ 2-\frac{1}{4},\ 3-\frac{1}{4},\ 4-\frac{1}{4} \dots 100-\frac{1}{4},\ 101-\frac{1}{4} \dots$

0 se Chhota

100 se Bda

Q G.S. of Eqn.

$a^{m+n} = a^m \cdot a^n$

$\boxed{5^{1/2}} + 5^{\frac{1}{2}+\log_5 \boxed{\sin x}} = 15^{\frac{1}{2}+\log_{15} \boxed{\cos x}}$ is ?

$\sqrt{5} + 5^{1/2} \cdot 5^{\log_5 \sin x} = 15^{\frac{1}{2}} \cdot 15^{\log_{15} \cos x}$

$\sqrt{5} + \sqrt{5}\sin x = \sqrt{15} \cdot \cos x$

$1 + \sin x = \sqrt{3}\cos x$

$\sqrt{3}\cos x - \sin x = 1$

$A\cos\theta + B\sin\theta$

$AA = \sqrt{\sqrt{3}^2 + (-1)^2}$

$= 2$

$\frac{\sqrt{3}}{2}\cos x - \frac{1}{2}\sin x = \frac{1}{2}$

$\sin\theta = -ve$

$\cos\left(x + \frac{\pi}{6}\right) = \cos\frac{\pi}{3}$

$\boxed{x + \frac{\pi}{6} = 2n\pi \pm \frac{\pi}{3}}$

$\theta,\ x + \frac{\pi}{6} = 2n\pi + \frac{\pi}{3}$

$\boxed{x = 2n\pi + \frac{\pi}{6}}$ ✓

$\theta,\ x + \frac{\pi}{6} = 2n\pi - \frac{\pi}{3}$

$x = 2n\pi - \frac{\pi}{2}$

Nishant Jindal

$\underline{T_6}$ Transforming Product into Sum / difference.

Q $\sin 5x \cdot \cos 3x = \sin 6x \cdot \cos 2x$ G.S.?

ये Prod इसे Sum/diff में बदलो

$$2\sin 5x\cos 3x = 2\sin 6x \cdot \cos 2x$$

$$\cancel{\sin(8x)} + \sin(2x) = \cancel{\sin(8x)} + \sin(4x)$$

$$\sin 2x = \sin 4x$$

diff → Prod

$$\sin 4x - \sin 2x = 0$$

$$2\cos(3x)\sin(x) = 0$$

$\cos(3x) = 0$

$3x = (2n+1)\frac{\pi}{2}$

$x = (2n+1)\frac{\pi}{6}$

$\sin(x) = 0$

$\boxed{x = n\pi}$