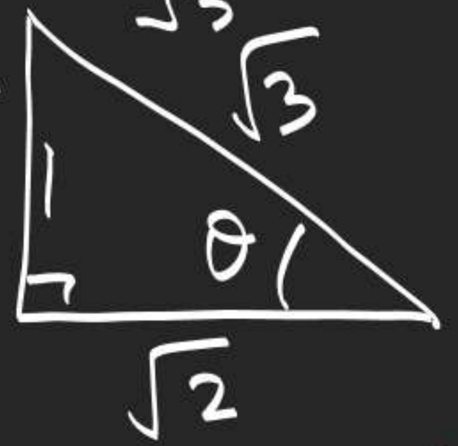
Nishant Jindal

36.

$$\tan\theta = \cos 135^\circ = 180^\circ - 45^\circ = -\frac{1}{\sqrt{2}}$$

θ — II, $\sin\theta = \frac{1}{\sqrt{3}}$, $\cos\theta = -\frac{\sqrt{2}}{\sqrt{3}}$

θ — IV, $\sin\theta = \frac{-1}{\sqrt{3}}$, $\cos\theta = \frac{\sqrt{2}}{\sqrt{3}}$



$$\tan\theta = -\frac{1}{\sqrt{2}}$$

$$\sec^2\theta = 1 + \tan^2\theta = 1 + \frac{1}{2} = \frac{3}{2}$$

$$\operatorname{cosec}^2\theta = 1 + \cot^2\theta = 1 + 2 = 3$$

$\theta \to$ II quad

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

$\theta \to$ IV quad

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

Nishant Jindal

34. $\sin(-634^\circ) - \cos(-634^\circ)$

$= \sin(86^\circ) - \cos(86^\circ) > 0$

$\theta \in \left(\frac{\pi}{4}, \frac{\pi}{2}\right)$

$\sin\theta > \cos\theta$

$\tan\theta > 1$

31. $\sin(-1125^\circ) + \cos(-1125^\circ)$

$= \sin(-45^\circ) + \cos(-45^\circ)$

$= -\sin 45^\circ + \cos(45^\circ)$

$= 0$

$1125 - 1080$

$\underline{45}$

Nishant Jindal

6.

$$\frac{\sin(A-B)}{\cos A\cos B} + \cdot \cdot - \cdot$$

$$= \frac{\sin A\cos B - \sin B\cos A}{\cos A\cos B} + \cdot \cdot -$$

$$= \tan A - \tan B + \tan B - \tan C + \tan C - \tan A$$

$$= 0$$

10.

$$\cos(\alpha+\beta)\cos\gamma - \cos(\beta+\gamma)\cos\alpha$$

$$= \left(\cos\alpha\cancel{\cos\beta} - \sin\alpha\sin\beta\right)\cos\gamma - \left(\cos\beta\cancel{\cos\gamma} - \sin\beta\sin\gamma\right)\cos\alpha$$

$$= \cos\alpha\sin\beta\sin\gamma - \sin\alpha\sin\beta\cos\gamma$$

$$= \sin\beta\left(\cos\alpha\sin\gamma - \sin\alpha\cos\gamma\right)$$

$$= \sin\beta\sin(\gamma-\alpha)$$

Product Into Sum Formulae

$$2\sin A\cos B = \sin(A+B) + \sin(A-B)$$

$$2\sin B\cos A = \sin(A+B) - \sin(A-B)$$

$$2\cos A\cos B = \cos(A+B) + \cos(A-B)$$

* $$2\sin A\sin B = \cos(A-B) - \cos(A+B)$$

$$\boxed{\begin{aligned} A+B &= C \\ A-B &= D \end{aligned}}$$

$$A = \frac{C+D}{2}$$

$$B = \frac{C-D}{2}$$

Sum Into Product Formulae

$$\sin C + \sin D = 2\sin\frac{C+D}{2}\cos\frac{C-D}{2}$$

$$\sin C - \sin D = 2\sin\frac{C-D}{2}\cos\frac{C+D}{2}$$

$$\cos C + \cos D = 2\cos\frac{C+D}{2}\cos\frac{C-D}{2}$$

* $$\cos C - \cos D = 2\sin\frac{C+D}{2}\sin\frac{D-C}{2}$$

Nishant Jindal

1. P.T. $\dfrac{\sin 7\theta - \sin 5\theta}{\cos 7\theta + \cos 5\theta} = \tan\theta$

$$\frac{2\sin\left(\frac{7\theta-5\theta}{2}\right)\cancel{\cos\left(\frac{7\theta+5\theta}{2}\right)}}{2\cancel{\cos\left(\frac{7\theta+5\theta}{2}\right)}\cos\left(\frac{7\theta-5\theta}{2}\right)} = \frac{\sin\theta}{\cos\theta} = \tan\theta.$$

2. If $\dfrac{(\sin 1^\circ + \sin 3^\circ) + (\sin 5^\circ + \sin 7^\circ)}{(\cos 1^\circ + \cos 3^\circ) + (\cos 5^\circ + \cos 7^\circ)} = \tan\theta$, $\underline{\underline{\theta}} \in \underline{3}^{rd}$ Quadrant

find θ.

$$= \frac{2\sin\frac{1+3}{2}\cancel{\cos\frac{1-3}{2}} + 2\sin\frac{5+7}{2}\cancel{\cos\frac{5-7}{2}}}{2\cos\frac{1+3}{2}\cancel{\cos\frac{1-3}{2}} + 2\cos\frac{5+7}{2}\cancel{\cos\frac{5-7}{2}}}$$

$$= \frac{\sin 2^\circ + \sin 6^\circ}{\cos 2^\circ + \cos 6^\circ} = \frac{2\sin 4^\circ \cancel{\cos 2^\circ}}{2\cos 4^\circ \cancel{\cos 2^\circ}}$$

$= \tan 4^\circ$

$= \tan(180^\circ + 4^\circ)$

$\boxed{\theta = 184^\circ}$

3. Simplify $\dfrac{(\cos\theta-\cos3\theta)(\sin8\theta+\sin2\theta)}{(\sin5\theta-\sin\theta)(\cos4\theta-\cos6\theta)}$

$$=\frac{\left(2\sin\left(\frac{3\theta-\theta}{2}\right)\sin\left(\frac{\theta+3\theta}{2}\right)\right)\left(2\sin\left(\frac{8\theta+2\theta}{2}\right)\cos\left(\frac{8\theta-2\theta}{2}\right)\right)}{\left(2\sin\left(\frac{5\theta-\theta}{2}\right)\cos\left(\frac{5\theta+\theta}{2}\right)\right)\left(2\sin\left(\frac{6\theta-4\theta}{2}\right)\sin\left(\frac{4\theta+6\theta}{2}\right)\right)}$$

$$=\frac{(2\cancel{\sin\theta}\,\cancel{\sin2\theta})(2\cancel{\sin5\theta}\,\cancel{\cos3\theta})}{(2\cancel{\sin2\theta}\,\cancel{\cos3\theta})(2\cancel{\sin\theta}\,\cancel{\sin5\theta})}=1$$

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4. If $\alpha = \frac{\pi}{19}$, find the value of $\frac{\sin(23\alpha) - \sin(3\alpha)}{\sin(16\alpha) + \sin(4\alpha)}$

$$\frac{2\cancel{\sin 10\alpha}\cos 13\alpha}{2\cancel{\sin 10\alpha}\cos 6\alpha} = \frac{\cos\frac{13\pi}{19}}{\cos\frac{6\pi}{19}}$$

$$= \frac{\cos\left(\pi - \frac{6\pi}{19}\right)}{\cos\left(\frac{6\pi}{19}\right)} = \frac{-\cos\frac{6\pi}{19}}{\cos\frac{6\pi}{19}}$$

$$= -1$$

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5: Find the value of expression

$$\frac{2\sin 8\theta\cos\theta - 2\sin 6\theta\cos 3\theta}{2\cos 2\theta\cos\theta - 2\sin 3\theta\sin 4\theta}, \text{ where } \theta = 7.5^\circ$$

$$= \frac{\left(\sin(\cancel{8\theta+\theta}) + \sin(8\theta-\theta)\right) - \left(\sin(\cancel{6\theta+3\theta}) + \sin(6\theta-3\theta)\right)}{\left(\cos(2\theta+\theta) + \cos(\cancel{2\theta-\theta})\right) - \left(\cos(\cancel{3\theta-4\theta}) - \cos(3\theta+4\theta)\right)}$$

$$= \frac{\sin 7\theta - \sin 3\theta}{\cos 3\theta + \cos 7\theta} = \frac{2\sin 2\theta\,\cancel{\cos 5\theta}}{2\,\cancel{\cos 5\theta}\cos 2\theta} = \tan 2\theta = \tan 15^\circ$$

$$\boxed{2-\sqrt{3}}$$

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6. Find the value of expression

$$\cos^2 73^\circ + \cos^2 47^\circ + \cos 73^\circ \cos 47^\circ$$

$$1 + \cos^2 73^\circ - \sin^2 47^\circ + \frac{1}{2}\left(2\cos 73^\circ \cos 47^\circ\right)$$

$$= 1 + \cos(47^\circ + 73^\circ)\cos(73^\circ - 47^\circ) + \frac{1}{2}\left(\cos(73^\circ + 47^\circ) + \cos(73^\circ - 47^\circ)\right)$$

$$= 1 + \cos(120^\circ)\cos(26^\circ) + \frac{1}{2}\left(\cos 120^\circ + \cos 26^\circ\right)$$

$\cos 180 - 60$
$= -\cos 60^\circ$
$= -\frac{1}{2}$

$$= 1 - \frac{1}{2}\cos 26^\circ + \frac{1}{2}\left(-\frac{1}{2} + \cos 26^\circ\right) = 1 - \frac{1}{4}$$

$$\boxed{= \frac{3}{4}}$$

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7. Given $\sin\alpha = \frac{15}{17}$, $\cos\beta = -\frac{5}{13}$, find $\cos(\alpha-\beta)$

$\sin\alpha$: I, II

$\cos\beta$: II, III

$\boxed{\frac{HW}{Ex-14}}$

$$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$$

α	β	$\cos\alpha$	$\sin\beta$	$\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$
I	II	$\frac{8}{17}$	$\frac{12}{13}$	$\frac{8}{17}\times\left(-\frac{5}{13}\right)+\left(\frac{15}{17}\right)\left(\frac{12}{13}\right)$
I	III			
II	II			
II	III	$-\frac{8}{17}$	$-\frac{12}{13}$	$\left(-\frac{8}{17}\right)\left(-\frac{5}{13}\right)+\left(\frac{15}{17}\right)\left(-\frac{12}{13}\right)$