

Date Planned : __ / __ / __	Daily Tutorial Sheet – 2	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	JEE Main (Archive)	Exact Duration: _____

9. Let $-\frac{\pi}{6} < \theta < -\frac{\pi}{12}$. Suppose α_1 and β_1 are the roots of the equation $x^2 - 2x \sec \theta + 1 = 0$, and α_2 and β_2 are the roots of the equation $x^2 + 2x \tan \theta - 1 = 0$. If $\alpha_1 > \beta_1$ and $\alpha_2 > \beta_2$, then $\alpha_1 + \beta_2$ equals to:
(A) $2(\sec \theta - \tan \theta)$ **(B)** $2 \sec \theta$ **(C)** $-2 \tan \theta$ **(D)** 0 **(2016)**
10. The value of $\sum_{k=1}^{13} \frac{1}{\sin\left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right) \sin\left(\frac{\pi}{4} + \frac{k\pi}{6}\right)}$ is equal to: **(2016)**
(A) $3 - \sqrt{3}$ **(B)** $2(3 - \sqrt{3})$ **(C)** $2(\sqrt{3} - 1)$ **(D)** $2(2 + \sqrt{3})$
- *11. If $\frac{\sin^4 x}{2} + \frac{\cos^4 x}{3} = \frac{1}{5}$, then: **(2009)**
(A) $\tan^2 x = \frac{2}{3}$ **(B)** $\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{1}{125}$
(C) $\tan^2 x = \frac{1}{3}$ **(D)** $\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{2}{125}$
12. Let $\theta \in \left(0, \frac{\pi}{4}\right)$ and $t_1 = (\tan \theta)^{\tan \theta}$, $t_2 = (\tan \theta)^{\cot \theta}$, $t_3 = (\cot \theta)^{\tan \theta}$ and $t_4 = (\cot \theta)^{\cot \theta}$, then: **(2006)** 
(A) $t_1 > t_2 > t_3 > t_4$ **(B)** $t_4 > t_3 > t_1 > t_2$ **(C)** $t_3 > t_1 > t_2 > t_4$ **(D)** $t_2 > t_3 > t_1 > t_4$
13. The number of ordered pairs (α, β) , where $\alpha, \beta \in (-\pi, \pi)$ satisfying $\cos(\alpha - \beta) = 1$ and $\cos(\alpha + \beta) = \frac{1}{e}$ is:
(A) 0 **(B)** 1 **(C)** 2 **(D)** 4 **(2005)**
14. $5(\tan^2 x - \cos^2 x) = 2 \cos 2x + 9$, then the value of $\cos 4x$ is: **(2017)**
(A) $-3/5$ **(B)** $1/3$ **(C)** $2/9$ **(D)** $-7/9$
15. If $f_k(x) = \frac{1}{k}(\sin^k x + \cos^k x)$, where $x \in R, k \geq 1$, then $f_4(x) - f_6(x)$ is equal to: **(2014)**
(A) $1/6$ **(B)** $1/3$ **(C)** $1/4$ **(D)** $1/12$
16. The expression $(\tan A)/(1 - \cot A) + (\cot A)/(1 - \tan A)$ can be written as: **(2013)**
(A) $\sin A \cos A + 1$ **(B)** $\sec A \cos ec A + 1$
(C) $\tan A + \cot A$ **(D)** $\sec A + \cos ec A$

17. In a ΔPQR , if $3\sin P + 4\cos Q = 6$ and $4\sin Q + 3\cos P = 1$, then the angle R is equal to: **(2012)**

- (A) $\frac{5\pi}{6}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{4}$ (D) $\frac{3\pi}{4}$

18. If $A = \sin^2 x + \cos^4 x$, then for all real x : **(1980)**

- (A) $13/16 \leq A \leq 1$ (B) $1 \leq A \leq 2$
(C) $3/4 \leq A \leq 13/16$ (D) $3/4 \leq A \leq 1$

19. Let $\cos(\alpha + \beta) = \frac{4}{5}$ and $\sin(\alpha - \beta) = \frac{5}{13}$, where $0 \leq \alpha, \beta \leq \frac{\pi}{4}$. Then, $\tan 2\alpha$ is equal to: **(2012)**

- (A) $25/16$ (B) $56/33$ (C) $19/12$ (D) $20/7$

20. Let A and B denote the statements: $A : \cos \alpha + \cos \beta + \cos \gamma = 0$, $B : \sin \alpha + \sin \beta + \sin \gamma = 0$

If $\cos(\beta - \gamma) + \cos(\gamma - \alpha) + \cos(\alpha - \beta) = -\frac{3}{2}$, then: **(2009)**

- (A) A is true and B is false (B) A is false and B is true
(C) Both A and B are true (D) Both A and B are false