

42. Consider the following statements :

निम्नलिखित कथनों पर विचार करें।

i. The value of $\cos 61^\circ + \sin 29^\circ$ cannot exceed 1.

$\cos 61^\circ + \sin 29^\circ$ का मान 1 से अधिक नहीं हो सकता।

ii. The value of $\tan 23^\circ - \cot 67^\circ$ is less than 0.

$\tan 23^\circ - \cot 67^\circ$ का मान 0 से कम है।

Which of the above statements is/are correct?

उपरोक्त कथनों में से कौन-सा सही है।

(A) i Only

(B) ii Only

(C) Both i and ii

(D) Neither i nor ii

43. If $\sin\theta\cos\theta = k$, where $0 \leq \theta \leq \frac{\pi}{2}$, then which one of the following is correct ?

यदि $\sin\theta\cos\theta = k$ है, जहाँ $0 \leq \theta \leq \frac{\pi}{2}$ हो, तो निम्नलिखित में से कौनसा सही है ?

(A) $0 \leq k \leq 1$

(B) $0 \leq k \leq 0.5$ only

(C) $0.5 \leq k \leq 1$ only

(D) $0 < k < 1$

44. What is the ratio of the greatest to the smallest value of $2 - 2 \sin x - \sin^2 x$, $0 \leq x \leq \frac{\pi}{2}$?

$2 - 2 \sin x - \sin^2 x$, $0 \leq x \leq \frac{\pi}{2}$ के महत्तम मान का इसके लघुत्तम मान से अनुपात क्या है ?

(A) -3

(B) -2

(C) 2

(D) 3

Solution

1.(A) $10 - \sin^2 \theta$

Max = $10 - 0 = 10$

Min = $10 - 1 = 9$

2.(D) $20 - \tan^2 \theta$

Max = $20 - 0 = 20$

Min = Not Defined

3.(C) $12 - \sec^2 \theta$

Max = $12 - 1 = 11$

Min = Not Defined

4.(C) $17 + \operatorname{cosec}^2 \theta$

Max = Not Defined

Min = $17 + 1 = 18$

5.(D) $16 - 17 \cot^2 \theta$

Max = Not defined

6.(B) $10 + 2 \sec^2 \theta$

Max = Not Defined

Min = 12

7.(D) $9 \sin^2 \theta + 21 \cos^2 \theta$

Max = 21

Min = 9

then the ratio is 7 : 3

8.(B) $-(9 \sin^2 \theta + 8 \cos^2 \theta)$

Max = -8

Min = -9

9.(A) $11 \sec^2 \theta + 17 \tan^2 \theta$

$11 + 11 \tan^2 \theta + 17 \tan^2 \theta$

$11 + 28 \tan^2 \theta$

Min

$11 + 0 = 11$

10.(C) $6 \sin \theta + 8 \cos^2 \theta$

Max = $\sqrt{a^2 + b^2} = 10$

Min = $-\sqrt{a^2 + b^2} = -10$

11.(C) $11 \cos^2 x + 6 \sin x \cos x + 3 \sin^2 x$

$9 \cos^2 x + 6 \sin \theta \cos \theta + \sin^2 \theta + 2$

$(3 \cos \theta + \sin \theta)^2 + 2$

Max = $(\sqrt{10})^2 + 2 = 12$

Min = $0 + 2 = 2$

12.(B) $3 \sin \alpha + 4 \cos \beta$

Max = $3 + 4 = 7$

Min = $-3 - 4 = -7$

13.(B) $\sin^5 \theta \times \cos^5 \theta$

Max = $\left(\frac{1}{2}\right)^5 = \frac{1}{32}$

Min = $-\left(\frac{1}{2}\right)^5 = -\frac{1}{32}$

14.(A) $\sin^6 \theta \times \cos^6 \theta$

Max = $\left(\frac{1}{2}\right)^6 = \frac{1}{64}$

Min = 0

15.(A) $\sin^4 \theta + \cos^4 \theta$

$1 - 2 \sin^2 \theta \cdot \cos^2 \theta$

Max = $1 - 0 = 1$

Min = $1 - 2 \times \left(\frac{1}{2}\right)^2 = \frac{1}{2}$

16.(B) $\sin^6 \theta + \cos^6 \theta$

$1 - 3 \sin^2 \theta \cdot \cos^2 \theta$

Max = $1 - 0 = 1$

Min = $1 - 3 \times \left(\frac{1}{2}\right)^2 = 1 - \frac{3}{4} = \frac{1}{4}$