

## Problem Set - JEE Mains 2021 (online)

### 3 JEE Main 2021 (Online) 24th February Evening Slot

MCQ (Single Correct Answer)

A possible value of  $\tan\left(\frac{1}{4}\sin^{-1}\frac{\sqrt{63}}{8}\right)$  is :

A  $\sqrt{7} - 1$

B  $\frac{1}{\sqrt{7}}$

C  $2\sqrt{2} - 1$

D  $\frac{1}{2\sqrt{2}}$

### 2 JEE Main 2021 (Online) 25th February Evening Shift

MCQ (Single Correct Answer)

$\operatorname{cosec}\left[2\cot^{-1}(5) + \cos^{-1}\left(\frac{4}{5}\right)\right]$  is equal to :

A  $\frac{75}{56}$

B  $\frac{65}{56}$

C  $\frac{56}{33}$

D  $\frac{65}{33}$

**1 JEE Main 2021 (Online) 26th February Morning Shift**

MCQ (Single Correct Answer)

If  $\frac{\sin^{-1}x}{a} = \frac{\cos^{-1}x}{b} = \frac{\tan^{-1}y}{c}$ ;  $0 < x < 1$ ,  
then the value of  $\cos\left(\frac{\pi c}{a+b}\right)$  is :

A  $\frac{1-y^2}{2y}$

B  $\frac{1-y^2}{y\sqrt{y}}$

C  $1 - y^2$

D  $\frac{1-y^2}{1+y^2}$

**4 JEE Main 2021 (Online) 26th February Evening Shift**

MCQ (Single Correct Answer)

If  $0 < a, b < 1$ , and  $\tan^{-1}a + \tan^{-1}b = \frac{\pi}{4}$ , then the value of

$(a+b) - \left(\frac{a^2+b^2}{2}\right) + \left(\frac{a^3+b^3}{3}\right) - \left(\frac{a^4+b^4}{4}\right) + \dots$  is :

A  $\log_e 2$

B  $e$

C  $\log_e \left(\frac{e}{2}\right)$

D  $e^2 = 1$

**3 JEE Main 2021 (Online) 16th March Evening Shift**

MCQ (Single Correct Answer)

Given that the inverse trigonometric functions take principal values only. Then, the number of real values of  $x$  which satisfy

$$\sin^{-1}\left(\frac{3x}{5}\right) + \sin^{-1}\left(\frac{4x}{5}\right) = \sin^{-1}x \text{ is equal to :}$$

A 2

B 0

C 3

D 1

**2 JEE Main 2021 (Online) 17th March Morning Shift**

MCQ (Single Correct Answer)

The sum of possible values of  $x$  for

$$\tan^{-1}(x+1) + \cot^{-1}\left(\frac{1}{x-1}\right) = \tan^{-1}\left(\frac{8}{31}\right) \text{ is :}$$

A  $-\frac{32}{4}$

B  $-\frac{33}{4}$

C  $-\frac{31}{4}$

D  $-\frac{30}{4}$

**1 JEE Main 2021 (Online) 17th March Morning Shift**

MCQ (Single Correct Answer)

If  $\cot^{-1}(\alpha) = \cot^{-1} 2 + \cot^{-1} 8 + \cot^{-1} 18 + \cot^{-1} 32 + \dots$  upto 100 terms, then  $\alpha$  is :

- A 1.02
- B 1.03
- C 1.01
- D 1.00

The number of solutions of the equation

$\sin^{-1} \left[ x^2 + \frac{1}{3} \right] + \cos^{-1} \left[ x^2 - \frac{2}{3} \right] = x^2$ , for  $x \in [-1, 1]$ , and  $[x]$  denotes the greatest integer less than or equal to  $x$ , is :

- A 0
- B Infinite
- C 2
- D 4

**3 JEE Main 2021 (Online) 20th July Morning Shift**

MCQ (Single Correct Answer)

The number of real roots of the equation  $\tan^{-1} \sqrt{x(x+1)} + \sin^{-1} \sqrt{x^2 + x + 1} = \frac{\pi}{4}$  is :

- A 1
- B 2
- C 4
- D 0

**2 JEE Main 2021 (Online) 20th July Evening Shift**

MCQ (Single Correct Answer)

The value of  $\tan\left(2\tan^{-1}\left(\frac{3}{5}\right) + \sin^{-1}\left(\frac{5}{13}\right)\right)$  is equal to :

A  $\frac{-181}{69}$

B  $\frac{220}{21}$

C  $\frac{-291}{76}$

D  $\frac{151}{63}$

**1 JEE Main 2021 (Online) 26th August Morning Shift**

MCQ (Single Correct Answer)

Let  $f(x) = \cos\left(2\tan^{-1}\sin\left(\cot^{-1}\sqrt{\frac{1-x}{x}}\right)\right)$ ,  $0 < x < 1$ . Then :

A  $(1-x)^2 f'(x) - 2(f(x))^2 = 0$

B  $(1+x)^2 f'(x) + 2(f(x))^2 = 0$

C  $(1-x)^2 f'(x) + 2(f(x))^2 = 0$

D  $(1+x)^2 f'(x) - 2(f(x))^2 = 0$

**4 JEE Main 2021 (Online) 26th August Evening Shift**

MCQ (Single Correct Answer)

If  $\sum_{r=1}^{50} \tan^{-1} \frac{1}{2r^2} = p$ , then the value of  $\tan p$  is :

A  $\frac{101}{102}$

B  $\frac{50}{51}$

C 100

D  $\frac{51}{50}$

**3 JEE Main 2021 (Online) 27th August Morning Shift**

MCQ (Single Correct Answer)

If  $(\sin^{-1} x)^2 - (\cos^{-1} x)^2 = a$ ;  $0 < x < 1$ ,  $a \neq 0$ , then the value of  $2x^2 - 1$  is :

A  $\cos\left(\frac{4a}{\pi}\right)$

B  $\sin\left(\frac{2a}{\pi}\right)$

C  $\cos\left(\frac{2a}{\pi}\right)$

D  $\sin\left(\frac{4a}{\pi}\right)$

**2 JEE Main 2021 (Online) 27th August Evening Shift**

MCQ (Single Correct Answer)

Let  $M$  and  $m$  respectively be the maximum and minimum values of the function  $f(x) = \tan^{-1}(\sin x + \cos x)$  in  $\left[0, \frac{\pi}{2}\right]$ , then the value of  $\tan(M - m)$  is equal to :

- A  $2 + \sqrt{3}$
- B  $2 - \sqrt{3}$
- C  $3 + 2\sqrt{2}$
- D  $3 - 2\sqrt{2}$

**1 JEE Main 2021 (Online) 1st September Evening Shift**

MCQ (Single Correct Answer)

$\cos^{-1}(\cos(-5)) + \sin^{-1}(\sin(6)) - \tan^{-1}(\tan(12))$  is equal to :

(The inverse trigonometric functions take the principal values)

- A  $3\pi - 11$
- B  $4\pi - 9$
- C  $4\pi - 11$
- D  $3\pi + 1$

