

JEE Main Shift 2 Analysis 27 JANUARY 2024

Mathematics:

1. If $2\tan^2\theta - 5 \sec\theta = 1$ has exactly 7 solutions in $[\theta, n\pi/2]$ for the least value of $n \in N$, then $\Sigma^n_{k=1}$ (k/2ⁿ) is equal to?

Answer. 91/2^13

2. If dy/dx = (x + y - 2) / (x - y), and y(0) = 2, then find y(2).

Answer. 0

3. Find the 20th term from the end of the progression: 20, 19(1/4), 18(1/2), 17(3/4), ..., -129(1/4)

Answer. -115

4. $\int_0^{\pi} dx / (1 - 2a \cos x + a^2) = ?$

Answer. I= $\pi/(1-a^2)$

5.
$$\int \frac{(x^8 - x^2)}{(x^{12} + 3x^6 + 1)tan^{-1}(x^3 + \frac{1}{x^3})} dx = ?$$

Answer.
$$\frac{1}{3}\ln\left|\left(tan^{-1}\left(x^3+\frac{1}{x^3}\right)\right)\right|+C$$

6. An urn contains 6 white and 9 black balls. Two successive draws of 4 balls are made without replacement. The probability that the first draw gives all white balls and the second draw gives all black balls is:

Answer. 3/715

7. Let $f: R - \left\{-\frac{1}{2}\right\} \to R$ and $g: R - \left\{-\frac{5}{2}\right\} \to R$ be defined as $f(x) = \frac{2x+3}{2x+1}$ and $g(x) = \frac{|x|+1}{2x+5}$ then the domain of the function of f(g(x)) is ?

8. Considering the principal values of inverse trigonometric functions, find the positive real values of x satisfying $\tan^{-1}(x) + \tan^{-1}(2x) = \pi/4$.

Answer. $\frac{\sqrt{17}-3}{4}$

9. Let R be the interior region between the lines 3x - y + 1 = 0 and x + 2y - 5 = 0 containing the origin. The set of all values of a for which points ($a^2 a + 1$) lies lie is?

Answer. $(-3,0) \cup (\frac{1}{3},1)$

10. The position vectors of vertices A, B, C of a triangle are i + 2j + 3k, i + j + 3k, 2i + j + 3k respectively. Let x is the length of the angle bisector of angle BAC, then the value of x^2 is?

Answer. $4 - 2\sqrt{2}$

11. If A is a 2 x 2 matrix and I is an Identity matrix of order 2 & $|A - \lambda^*I| = 0$ gives values of λ as -1 & 3. Then, the trace of A^2 is equal to?



Answer. 10

12. The area bounded by $0 \le y \le min\{2x, 6x - x^2\}$ and x-axis is A. then 12A is:

Answer. 304 sq.units.

13. If the line x + y = 0 is tangent to the circle $(x - \lambda)^2 + (y - \beta)^2 = 50$, then $(\lambda + \beta)^2 = ?$

Answer. 100

14. If the mean of 15 observations is 12 and the standard deviation is 3. If 12 is replaced by 10 in data, then the new mean is μ and variance is σ^2 then what is the value of $15(\mu + \mu^2 + \sigma^2) = ?$

Answer. 2429

