01-07-2020 SHIFT-1-1-15

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1) The area of the region,enclosed by the circle $x^2+y^2=2$ which is not common to the region bounded by the parabola $y^2=x$ and straight line $y=x$, is
   a) $\left(\frac{1}{3}\right)(12\pi-1)$
   b) $\left(\frac{1}{6}\right)(12\pi-1)$
   c) $\left(\frac{1}{3}\right)(6\pi-1)$
   d) $\left(\frac{1}{6}\right)(24\pi-1)$

2) Total number of six-digit numbers in which only and all five digits $1,3,5,7$ and 9 appear, is
   a) 5^6
   b) $\left(\frac{1}{2}\right)(6!)$
   c) $6!$
   d) $\left(\frac{5}{2}\right)6!$

3) An unbiased coin is tossed 5 times. Suppose that a variable X is assigned the value k when k consecutive heads are obtained for $k=3,4,5$, otherwise X takes the value -1. The expected value of X, is
   a) $\frac{1}{8}$
   b) $\frac{3}{16}$
   c) $\frac{-1}{8}$
   d) $\frac{-3}{16}$

4) If Re $\frac{(z-1)}{(2z+i)}=1$, where $z=x+iy$, then the point (x,y) lies on a
   a) circle whose centre is at $\left(\frac{-1}{2},\frac{-3}{2}\right)$
   b) straight line whose slope is $\frac{3}{2}$
   c) circle whose diameter is $\frac{\sqrt{5}}{2}$
   d) straight line whose slope is $\frac{-2}{3}$

5) If $f(a+b+1-x)=f(x)\,\forall x$, where a and b are fixed positive real numbers,then $\frac{1}{(a+b)}\int_a^b x\,(f(x)+f(x+1))\,dx$ is equal to
   a) $\int_{a-1}^{b-1} f(x)\,dx$
   b) $\int_{a+1}^{b+1} f(x+1)\,dx$
   c) $\int_{a-1}^{b-1} f(x+1)\,dx$
   d) $\int_{a+1}^{b+1} f(x)\,dx$

6) If the distance between the foci of an ellipse is 6 and the distance between its directrices is 12, then the length of its latus rectum is
   a) $2\sqrt{3}$
   b) $\sqrt{3}$
   c) $\frac{3}{\sqrt{2}}$
   d) $3\sqrt{2}$

7) The logical statement $(p \implies q)\wedge(q \implies \sim p)$ is equivalent to
   a) $\sim p$
   b) p
   c) q
   d) $\sim q$

8) Te greatest positive integer k, for which 49^k+1 is a factor of the sum $49^{125}+49^{124}+\cdots+49^2+49+1$, is
   a) 32
   b) 60
   c) 65
   d) 63

9) A vector $\mathbf{a}=\alpha\hat{i}+2\hat{j}+\beta\hat{k}\,(\alpha,\beta\in\mathbf{R})$ lies in the plane of the vectors,$\mathbf{b}=\hat{i}+\hat{j}$ and $\mathbf{c}=\hat{i}-\hat{j}+4\hat{k}$.If $\mathbf{a}$ bisects the angle between $\mathbf{b}$ and $\mathbf{c}$, then
   a) $\mathbf{a}\hat{i}+3=0$
   b) $\mathbf{a}\hat{k}+4=0$
   c) $\mathbf{a}\hat{i}+1=0$
   d) $\mathbf{a}\hat{k}+2=0$

10) If $y(\alpha)=\sqrt{2\left(\frac{\tan\alpha+\cot\alpha}{1+\tan^2\alpha}\right)+\frac{1}{\sin^2\alpha}}$ where $\alpha\in\left(\frac{3\pi}{4},\pi\right)$ then $\frac{dy}{d\alpha}$ at $\alpha=\frac{5\pi}{6}$ is
    a) $-\frac{1}{4}$
    b) $\frac{4}{3}$
    c) 4
    d) -4

11) $y = mx + 4$ is a tangent to both the parabolas, $y^2 = 4x$ and $x^2 = 2by$, then b is equal to
   a) -64
   b) 128
   c) -128
   d) -32

12) Let α be a root of the equation $x^2 + x + 1 = 0$ and the matrix $A = \frac{1}{\sqrt{3}} \begin{pmatrix} 1 & 1 & 1 \\ 1 & \alpha & \alpha^2 \\ 1 & \alpha^2 & \alpha^4 \end{pmatrix}$ then the matrix A^{31} is equal to
   a) A
   b) A^2
   c) A^3
   d) l_3

13) If $g(x) = x^2 + x - 1$ and $(gof)(x) = 4x^2 - 10x + 5$,then $f\left(\frac{5}{4}\right)$ is equal to
   a) $\frac{-3}{2}$
   b) $\frac{-1}{2}$
   c) $\frac{1}{2}$
   d) $\frac{3}{2}$

14) let α and β are two real roots of the equation $(k+1)\tan^2 x - \sqrt{2}\lambda \tan x = 1 - k$, where $(k \neq -1)$ and are real numbers. If $\tan^2(\alpha + \beta) = 50$, then value of λ is
   a) $5\sqrt{2}$
   b) $10\sqrt{2}$
   c) 10
   d) 5

15) Let P be a plane passing through the points $(2, 1, 0), (4, 1, 1)$ and $(5, 0, 1)$ and R be any point $(2, 1, 6)$. Then the image of R in the plane P is:
   a) $(6, 5, 2)$
   b) $(6, 5, -2)$
   c) $(4, 3, 2)$
   d) $(3, 4, -2)$