SBOA SCHOOL & JUNIOR COLLEGE, CHENNAI -101

MATHS HOLIDAY ASSIGNMENT

CLASS XII

1. Prove that $f: N \to N$, defined by $f(m) = m^2 + m + 1$ for all $m \in N$, is one-one but not onto.

2. Solve for x
$$\tan^{-1}\left(\frac{x-1}{x+1}\right) + \tan^{-1}\left(\frac{2x-1}{2x+1}\right) = \tan^{-1}\left(\frac{23}{36}\right)$$

3. Prove that $\sin^{-1}\left(\frac{12}{13}\right) + \cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{63}{16}\right) = \pi$

4. if $a \neq p$, $b \neq q$, $c \neq r$ and $\begin{vmatrix} p & b & c \\ a & q & c \\ a & b & r \end{vmatrix} = 0$

find the value of $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c}$.

5) If $f(x) = \begin{cases} \frac{1-\sin^3 x}{3\cos^2 x}, & x < \pi/2 \\ a, & x = \pi/2 \\ \frac{b(1-\sin x)}{(\pi - 2x)^2}, & x > \pi/2 \end{cases}$ is continuous at $x = \pi/2$ find the values of a and b

6) If $x = \frac{\sin^3 t}{\sqrt{\cos 2t}}$ $y = \frac{\cos^3 t}{\sqrt{\cos 2t}}$ Find $\frac{dy}{dx}$

7) Examine the following function for continuity and differentiability at $x = 1$ and $x = 3$
$$f(x) = |x-1| + |x-3|.$$

10) $\int \frac{dx}{\operatorname{cosec} x + \cos x}$

11) Evaluate by using properties of definite integrals.

(a) $\int_0^{\pi/2} \frac{x \sin x \cos x \, dx}{\sin^4 x + \cos^4 x}$. (b) $\int_0^1 \frac{\log(1+x)}{1+x^2} dx$.

12) Using Integration find the area of the region enclosed between the circles $x^2 + y^2 = 4$ and $(x-2)^2 + y^2 = 4$.

13) Using integration find the area of the triangle ABC whose vertices are A(4, 1) B(6, 6) and C(8, 4).

14) Solve the differential equation $(1+e^{2x})\,dy + (1+y^2)\,e^x\,dx = 0$, given that $y=1$, $x=0$

15) Solve the differential equation $(x-y)\frac{dy}{dx} = x+2y$.

16) Solve. $(1+y^2)\,dx + (x - e^{-\tan^{-1} y})\,dy = 0$ given that $y=0$, $x=0$.

17) Find the image of the point P(2, −1, 5) in the line $\vec{r} = 11\hat{i} - 2\hat{j} - 8\hat{k} + \lambda(10\hat{i} - 4\hat{j} - 11\hat{k})$

18) Find the equation of the plane through the line of intersection of the planes $3x - 4y + 5z = 10$ and $2x + 2y - 3z = 4$ and parallel to the line $x = 2y = 3z$.

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