

Holiday Homework
 CLASS - XII
 Subject - Maths

Q1 Prove that

$$\cot\left(\frac{\pi}{4} - 2\cot^{-1}3\right) = 7$$

Q2 If $2\tan^{-1}(\cos\theta) = \tan^{-1}(2\sec\theta)$ then show that $\theta = \frac{\pi}{4}$

Q3 Find A if $\begin{bmatrix} 4 \\ 1 \\ 3 \end{bmatrix} A = \begin{bmatrix} -4 & 8 & 4 \\ -1 & 2 & 1 \\ -3 & 6 & 3 \end{bmatrix}$

Q4 Using the properties of determinants prove that

(i)
$$\begin{vmatrix} y^2z^2 & yz & y+z \\ z^2x^2 & zx & z+x \\ x^2y^2 & xy & x+y \end{vmatrix} = 0$$

(ii)
$$\begin{vmatrix} y+z & z & y \\ z & z+x & x \\ y & x & x+y \end{vmatrix} = 0$$

Q5 If $A = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$

then find the value of BA and use this solve the system of equations

$$y + 2z = 7; \quad x - y = 3 \quad \text{and} \quad 2x + 3y + 4z = 17$$

Q6 If $a + b + c \neq 0$ and
$$\begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix} = 0$$
 then prove that $a = b = c$

Q7 Find which of the functions is continuous or discontinuous

(i)
$$f(x) = \begin{cases} \frac{1 - \cos 2x}{x^2} & \text{if } x \neq 0 \\ 5 & \text{if } x = 0 \end{cases} \quad \text{at } x = 0$$

(ii)
$$f(x) = \begin{cases} \frac{e^{1/x}}{1 + e^{1/x}} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases} \quad \text{at } x = 0$$

(iii)
$$f(x) = \begin{cases} \frac{\sqrt{1+kx} - \sqrt{1-kx}}{x} & \text{if } -1 \leq x \leq 1 \\ \frac{2x+1}{x-1} & \text{if } 0 \leq x \leq 1 \end{cases} \quad \text{at } x = 0$$

Q8 Differentiate each of the following w.r.t. x

(i) $y = \frac{\cos^2 x}{2\theta}$

(ii) $\cos(\tan \sqrt{x+1})$

Q9 Find $\frac{dy}{dx}$ if

(i) $y^x = e^{y-x} \quad (\cos x) \rightarrow \infty$

(ii) $y = (\cos x)^{(\cos x)}$

Q 9 If $x^m \cdot y^n = (x+y)^{m+n}$ Prove that

$$(i) \quad \frac{dy}{dx} = \frac{y}{x} \quad (ii) \quad \frac{d^2y}{dx^2} = 0$$

Q 10 If $x = \sin t$ and $y = \sin pt$ prove that

$$(1-x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} + p^2 y = 0$$

Note Holiday Homework to be submitted latest by 4th July '18.