

DELHI PUBLIC SCHOOL, JAMMU

ASSIGNMENT FOR PERIODIC TEST-1

(2017-18)

SUB.: MATHEMATICS

CLASS: XII

Q1. If $F(x)$ is invertible function, then find the inverse of $f(x) = \frac{3x-2}{5}$

Q2. Let $S = \{a, b, c\}$, find the total number of binary operations on S .

Q3. Write the Principal value of $\tan^{-1}3 - \sec^{-1}(-2)$.

Q4. Prove that $\cot^{-1}7 + \cot^{-1}8 + \cot^{-1}18 = \cot^{-1}3$.

Q5. Show that $A = \begin{bmatrix} 2 & -3 \\ 3 & 4 \end{bmatrix}$ satisfies the equation $x^2 - 6x + 17 = 0$. Find A^{-1} .

Q6. Find the number of reflexive relations from set A to A , defined as $A = \{a, b, c\}$.

Q7. Prove that
$$\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3.$$

Q8. Show that the points $A(a, b+c)$, $B(b, c+a)$ and $C(c, a+b)$ are collinear.

Q10. Prove that $\tan\left(\frac{\pi}{4} + \frac{1}{2}\cos^{-1}\frac{a}{b}\right) + \tan\left(\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\frac{a}{b}\right) = \frac{2b}{a}$.

Q11. Using properties of determinants, prove
$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = ab+bc+ca+abc.$$

Q12. Using elementary transformations, find the inverse of the matrix $A = \begin{pmatrix} 1 & -2 & 0 \\ 2 & 1 & 3 \\ 0 & -2 & 1 \end{pmatrix}$ and use it to solve the following system of linear equations. $X-2y=10$, $2x+y+3z=8$ and $-2y+z=7$.

Q13. Using properties of determinant, prove the following:

$$\begin{vmatrix} 3a & -a+b & -a+c \\ a-b & 3b & c-b \\ a-c & b-c & 3c \end{vmatrix} = 3(a+b+c)(ab+bc+ca).$$

Q14. Prove that $\cos^{-1}\left(\frac{\cos\alpha + \cos\beta}{1 + \cos\alpha \cos\beta}\right) = 2\tan^{-1}\left(\frac{\tan\alpha}{2 + \tan\beta}\right)$.

Q15. Mr. X has invested a part of his investment in 10% bond A and a part in 15% bond B. His interest income during first year is rupees 4000. If he invests 20% more in 10% bond A and 10% more in 15% bond B, his income during second year increases by rupees 500. Find the initial amount of investment in respective bonds, using matrix method. Is investment necessary for an average person?

Q16. Show that the relation R on the set $A = \{x \in \mathbb{Z} : 0 \leq x \leq 12\}$ given by relation $R = \{(a, b) : |a - b| \text{ is a multiple of } 4\}$ is an equivalence relation.