Name: _____

Grade: XII **Holiday-Work**

Subject: MATHEMATICS

Each Carries One marks

Q. 1 Let A = {1, 2, 3} and let R = {(1, 1), (2, 2), (3, 3), (1, 3), (3, 2), (1, 2)}. Then, R is

Q. 2 Let S be the set of all straight lines in a plane. Let R be a relation on S defined by a R b Γ a \\ b. Then, R is

Q. 3 Let S be the set of all real numbers and let R be a relation on S, defined by a R b Γ (1 + ab) > 0. Then, R is

Q. 4 Show that $\cos^{-1}\left\{\frac{-\pi}{3}\right\} \neq \frac{-\pi}{3}$ and find its value.

Q. 5 Show that $\sin^{-1}\left\{\frac{3\pi}{4}\right\} \neq \frac{3\pi}{4}$ and find its value.

Q. 6 Show that $\tan^{-1}\left\{\frac{5\pi}{6}\right\} \neq \frac{5\pi}{6}$ and find its value

Q. 7 Evaluate: $\sin\left\{\frac{\pi}{3} - \sin^{-1}\frac{-1}{2}\right\}$

Q. 8 If a matrix has 6 elements, write all possible order it can have?

Q. 9 If order of matrix A is 2x3 and order of matrix B is 3 x 4 , find the order of AB.

Q. 10 Write the value of x + y + z if $\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix} = \begin{bmatrix}1\\ -1\\ 0\end{bmatrix}$

Each Carries Two marks

Q. 11 Let R = {(a, b) : a, b Y N and a + 3b = 12}. Find the domain and range of R.

Q. 12 Let R = {(a, b) : a, b Y N and b = a + 5, a < 4}. Find the domain and range of R.

Q. 13 Let R_0 be the set of all nonzero real numbers. Show that f : R_0 Δ R_0 : f (x) = $\frac{1}{x}$ is a one-one onto function.

Q. 14 Show that the function f : R Δ R : f (x) = 3 - 4x is one-one onto and hence bijective.

Q. 15 Let A and B be two nonempty sets. Show that the function f : (A × B) Δ (B × A) : f (a, b) = (b, a) is a bijective function.

Q. 16 If the matrix $\begin{bmatrix}0 & a & 3\\ 2 & b & -1\\ c & 1 & 0\end{bmatrix}$ is skew symmetric, find a + b + c.

Q. 17 Evaluate: $\cos\left\{\sin^{-1}\frac{3}{5} + \sin^{-1}\frac{5}{13}\right\}$

Q. 18 Evaluate: $\tan^{-1}\left\{2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right\}$

Q. 19 Prove that: $\tan^{-1}\frac{3}{4} + \tan^{-1}\frac{3}{5} - \tan^{-1}\frac{8}{19} = \frac{\pi}{4}$

Q. 20 Prove that: $2\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{7} = \tan^{-1}\frac{31}{17}$

Each Carries three marks

Q. 21 Let A be the set of all points in a plane and let O be the origin. Show that the relation R = {(P, Q) : P, Q Y A and OP = OQ} is an equivalence relation.

Q. 22 Show that the function f : N Δ N, defined by

$$f(x) = \begin{cases} x + 1, & \text{if } x \text{ is odd} \\ x - 1, & \text{if } x \text{ is even} \end{cases}$$

is one-one and onto.

Q. 23 Show that the signum function f : R Δ R, defined by

$$f(x) = \begin{cases} 1, & \text{if } x > 0 \\ 0, & \text{if } x = 0 \\ -1, & \text{if } x < 0 \end{cases}$$

is neither one-one nor onto.

Q. 24 Prove that: $\tan^{-1}\frac{3}{4} + \tan^{-1}\frac{3}{5} - \tan^{-1}\frac{8}{19} = \frac{\pi}{4}$

Q. 25 Prove that: $2\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{7} = \tan^{-1}\frac{31}{17}$

Q. 26 Prove that: $\sin^{-1}\frac{3}{5} - \sin^{-1}\frac{8}{17} = \cos^{-1}\frac{84}{85}$

Q. 27 Prove that: $\tan^{-1}\left(\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right) = \frac{\pi}{4} + \frac{1}{2}\cos^{-1}x^2$

Q. 28 Prove that: $\tan^{-1}\left(\frac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1+x}}\right) = \frac{\pi}{4} - \frac{1}{2}\cos^{-1}x$

Q. 29 If $F(x) = \begin{bmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then show that F(x) . F(y) = F(x + y)

Q. 30 Using elementary operation, find the inverse of the matrix $\begin{bmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{bmatrix}$