Holiday Homework
Class- 12th
Subject- Maths
Chapter 1: Relations and Functions

Section-A

(Multiple Choice Questions)

In each of the Questions from 1 to 30 choose the correct option

Q 1 . Let A = {1, 2, 3} and consider the relation R = {(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1, 3)}. Then R is
(a) reflexive but not symmetric
(b) reflexive but not transitive
(c) symmetric and transitive
(d) neither symmetric, nor transitive

Q 2. If R be a relation in the set N given by R = { (a,b) : a - b = 5 , a > 7 } , then

(a) (7, 2) $\in$ R
(b) (15,12) $\in$ R
(c) (9 ,4) $\in$ R
(d) (8, 2) $\in$ R

Q 3. Let A = { a,b,c,d }, then a relation R = { (a,a),(a,b),(a,c),(b,c),(b,d),(c,d),(d,a) } on set A is

(a) reflexive
(b) Symmetric
(c) Transitive
(d) none of these

Q 4.Let us define a relation R in R as aRb if a $\geq$ b. Then R is
(a) an equivalence relation
(b) reflexive, transitive but not symmetric
(c) symmetric, transitive but not reflexive
(d) neither transitive nor reflexive but symmetric

Q 5. Let R be the relation "is congruent to" on the set of all triangles in a plane is
(a) reflexive
(b) symmetric
(c) symmetric and reflexive
(d) equivalence

Q 6. Let R be a relation on the set N of natural numbers denoted by x R y $\Leftrightarrow$ x is a factor of y . Then, R is
(a) Reflexive and symmetric
(b) Transitive and symmetric
(c) Equivalence
(d) Reflexive, transitive but not symmetric

Q 7. Let S = {1, 2, 3, 4, 5} and let A = S × S. Define the relation R on A as follows:
(a, b) R (c, d) iff ad = cb. Then, R is
(a) reflexive only
(b) Symmetric only
(c) Transitive only
(d) Equivalence relation

Q 8. If R be the relation on Z (the set of Integers) defined as R = { (a,b) : a,b ∈ Z and |a − b| is divisible by 4 }. Then R is
(a) reflexive
(b) Symmetric
(c) Transitive
(d) All of the above

Q 9. A relation R in the set {1,2,3} is given by R − {(1,2),(2,1),(3,3),(2,2)} . Which of the following ordered pairs should be added in R to make it Transitive
(a) (1,3)
(b) (2,3)
(c) (1,1)
(d) (3,1)

Q 10. Let set A = {a,b,c} and R is the relation in A given by R = {(a,a),(a,b),(a,c),(b,a),(c,c)}. Which of the following pairs be added in R to make it symmetric .
(a) (c,a)
(b) (b,b)
(c) (b,c)
(d) None of these

Q 11 . A relation R on the set A of all triangles is given by R = {(T_1, T_2): T_1 is similar to T_2}. Consider three right angle triangles T_1 with sides 3, 4, 5, T_2 with sides 5, 12, 13 and T_3 with sides 6, 8, 10. Which of the following pairs of triangles among T_1, T_2 and T_3 are related?
(a) (T_1 , T_2)
(b) (T_2 , T_3)
(c) (T_1 , T_3)
(d) All of these

Q 12. The maximum number of equivalence relations on the set A = {1, 2, 3} are
(a) 1
(b) 2
(c) 3
(d) 5

Q 13. If a relation R defined on the set A = { 1,2,3 } is given by R = { (1,2) }, then R is

(a) Reflexive
(b) Transitive
(c) Symmetric
(d) None of these

Chapter 2: Inverse Trigonometric Functions

Section-A

(Multiple Choice Questions)

Q1.The value of the expression $\cot\left[\cos^{-1}\left(\frac{7}{25}\right)\right]$ is

(A) $\frac{25}{24}$ (B) $\frac{25}{7}$ (C) $\frac{24}{25}$ (D) $\frac{7}{24}$

Q2. The value of the expression $2\sec^{-1}2 + \sin^{-1}\left(\frac{1}{2}\right)$ is

(A) $\frac{13\pi}{6}$ (B) $\frac{\pi}{6}$ (C) $\frac{5\pi}{6}$ (D) $\frac{7\pi}{6}$

Q3. $\sin(\tan^{-1}x)$, $|x| < 1$ *is equal to*

(A) $\frac{x}{\sqrt{1-x^2}}$ (B) $\frac{1}{\sqrt{1-x^2}}$ (C) $\frac{x}{\sqrt{1+x^2}}$ (D) $\frac{x}{\sqrt{1+x^2}}$

Q4. The value of the expression $\cos^{-1}\left(\cos\frac{13\pi}{6}\right)$ is

(A) $\frac{13\pi}{6}$ (B) $\frac{\pi}{6}$ (C) $-\frac{\pi}{6}$ (D) $-\frac{13\pi}{6}$

Q5. The value of the expression $\tan^{-1}\left(\tan\frac{7\pi}{6}\right)$ is

(A) $\frac{7\pi}{6}$ (B) $-\frac{\pi}{6}$ (C) $\frac{\pi}{6}$ (D) $-\frac{7\pi}{6}$

Q6. The value of the expression $\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$ is

(A) $\frac{2\pi}{5}$ (B) $-\frac{\pi}{5}$ (C) $\frac{\pi}{5}$ (D) $\frac{3\pi}{5}$

Q7.The value of the expression $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$ is

(A) $\frac{2\pi}{3}$ (B) $\frac{\pi}{3}$ (C) $-\frac{\pi}{3}$ (D) $-\frac{2\pi}{3}$

Q8. The value of the expression $\tan^{-1}\left(\tan\frac{3\pi}{4}\right)$ is

(A) $-\frac{3\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $-\frac{\pi}{4}$ (D) none

Q9.The value of the expression $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$ is

(A) $\frac{7\pi}{6}$ (B) - $\frac{5\pi}{6}$ (C) $\frac{\pi}{6}$ (D) $\frac{5\pi}{6}$

Q10. The value of the expression $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$ is

(A) **1** (B) $\frac{1}{2}$ (C) **0** (D) $\frac{\sqrt{3}}{2}$

Q11. The value of the expression $\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$ is

(A) $\frac{\pi}{2}$ (B) $-\frac{\pi}{2}$ (C) $\frac{\pi}{3}$ (D)**0**

Q12. $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$ is equal to

(A) $\frac{\pi}{2}$ (B) $-\frac{\pi}{3}$ (C) $\frac{\pi}{3}$ (D) $\frac{2\pi}{3}$

Q13. $\tan^{-1}(1) + \cos^{-1}\left(-\frac{1}{2}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$ is equal to

(A) $\frac{\pi}{4}$ (B) $\frac{3\pi}{4}$ (C) - $\frac{3\pi}{4}$ (D) $\frac{2\pi}{3}$

Q14. $2\sin^{-1}\left(\frac{1}{2}\right) + \cos^{-1}\left(\frac{1}{2}\right)$ is equal to

(A) $\frac{2\pi}{3}$ (B) $\frac{\pi}{3}$ (C) - $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

Q15. If $\sin^{-1}x = y$ then

(A) $0\leq y \leq \pi$ (B) $0< y < \pi$ (C) $-\frac{\pi}{2}\leq y \leq \frac{\pi}{2}$ (D) $-\frac{\pi}{2}< y < \frac{\pi}{2}$

Q16. If $\cos^{-1}x = y$ then

(A) $0\leq y \leq \pi$ (B) $0< y < \pi$ (C) $-\frac{\pi}{2}\leq y \leq \frac{\pi}{2}$ (D) $-\frac{\pi}{2}< y < \frac{\pi}{2}$

Q17. If $\tan^{-1}x = y$ then

(A) $0\leq y \leq \pi$ (B) $0< y < \pi$ (C) $-\frac{\pi}{2}\leq y \leq \frac{\pi}{2}$ (D) $-\frac{\pi}{2}< y.< \frac{\pi}{2}$

Q18. The principal value branch of $\csc^{-1}x$ is

(A) $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ (B) $[0, \pi] - \left\{\frac{\pi}{2}\right\}$ (C) $[-\frac{\pi}{2},\frac{\pi}{2}]$ (D) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right] - \{\,\mathbf{0}\,\}$

Chapter 3: Matrices

Section-A

(Multiple Choice Questions)

Q1. If A and B matrices are of same order and A + B = B + A, this law is known as:

  A. Distributive law

   B Commutative law

  C. Associative law

  D. Cramer's law

Q2 If determinant of a matrix is equal to zero, then it is said to be:

  A. square matrix

  B. singular matrix

  C. non-singular matrix

  D. identical matrix

Q3. If a matrix 'A' has 'm' number of columns and 'n' number of rows then m × n is said to be:

  A. transpose of a matrix

  B. order of a matrix

  C. determinant of a matrix

  D. equality of a matrix

Q4. If A and B are 2 matrices such that AB = B and BA = A, then $A^2 + B^2$ is:

i) 2AB

ii) 2BA

iii) A+B

iv) AB

Q5. If A and B are symmetric matrices of the same order, then (AB'–BA') is a

a. Skew symmetric matrix

b. Symmetric matrix

c. Both

d. None of the above

Q6. If A is a 3x3 matrix, $|A| \neq 0$ and $|3A| = 3k|A|$, Then find the value of k.

A. 3

B. 9

C. 27

D. none of these

Q7. The solutions of system of linear equations $x + y + z = 6$, $y + 3z = 11$, $x - 2y + z = 0$.

Are:

a. X=1, y=2, z=3

b. X=1, y=2, z= -3

c. X=2, y=3, z=1

d. X=3, z=2, y=1

Q8. If A=$\begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ and A2=8A+kI, Then find the value of k

a. 7

B.-7

c. 6

d. -6

Q9. If A=$\begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$, B=$\begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$ and $(A+B)^2 = A^2 + B^2$, then what is the value of a and b.

A. a=1, b=4

B. a=2, b=3

C. a=4, b=3

D. a=3, b=7

Q10. If A=$\begin{bmatrix} 3 & x-1 \\ 2x+3 & x+2 \end{bmatrix}$ is a symmetric matrix, then x=?

A. 4

B. 3

C. -4

D. -3

Q11. If A=$\begin{bmatrix} 1 & 3 \\ 3 & 4 \end{bmatrix}$, $A^2 - kA - 5I = O$, Then K=?

A. 5

B. 3

C. 7

D. none of these

Q12. For any square matrix A, AA^T is a:

(a) Unit matrix   (b) symmetric matrix

(c) skew-symmetric matrix   (d) diagonal matrix

Q13. If a matrix A is both symmetric and skew-symmetric, then

(A) A is a diagonal matrix

(b) A is a zero matrix

Chapter 4: Determinants

Section-A

(Multiple Choice Questions)

1. Determinant is:

    a. Real number associated to a square matrix.

    b. Complex matrix associated to a square matrix.

    c. Real or complex number associated to a square matrix.

    d. Real or complex number associated to a matrix.

2. Value of determinant of A = $\begin{bmatrix} 1 & 2 \\ 4 & 6 \end{bmatrix}$ is

    a. 2

    b. -2

    c. 5

    d. None of these.

3. Determinant of matrix P = $\begin{bmatrix} 2 & 3 & 4 \\ 5 & 6 & 7 \end{bmatrix}$ is

    a. 2

    b. 3

    c. 4

    d. None of these.

4. Value of $\begin{vmatrix} cos15^0 & sin15^0 \\ sin15^0 & cos15^0 \end{vmatrix}$ is :

    a.   1

    b.   ½

    c.   √3/2

    d.   None of these

5. The value of $\begin{vmatrix} 5^2 & 5^3 & 5^4 \\ 5^3 & 5^4 & 5 \\ 5^4 & 5^5 & 5^6 \end{vmatrix}$ is:

    a. 5^2

    b. 0

    c. 5^{13}

    d. 5^9

6. Value of $\begin{vmatrix} 1! & 2! & 3! \\ 2! & 3! & 4! \\ 3! & 4! & 5! \end{vmatrix}$ is:

   a. 2

   b. 6

   c. 24

   d. 120

7. If $\begin{vmatrix} 1-x & 2 & 3 \\ 0 & x & 0 \\ 0 & 0 & x \end{vmatrix} = 0$, then its roots are :

   a. 1 only

   b. 0,1

   c. 0 only

   d. -1,0 & 1

8. Which of the following is correct

   a. Determinant is a square matrix.

   b. Determinant is a number associated to a matrix.

   c. Determinant is a number associated to a square matrix.

   d. None of these.

9. Value of $\begin{vmatrix} a+ib & c+id \\ -c+id & a-ib \end{vmatrix}$ is:

   a. $a^2 + b^2 - c^2 - d^2$

   b. $a^2 - b^2 + c^2 - d^2$

   c. $a^2 + b^2 + c^2 + d^2$

   d. None of these.

10. If $\Delta_1 = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix}$ and $\Delta_2 = \begin{vmatrix} 1 & bc & a \\ 1 & ca & b \\ 1 & ab & c \end{vmatrix}$, then

   a. $\Delta_1 + \Delta_2 = 0$

   b. $\Delta_1 + 2\Delta_2 = 0$

   c. $\Delta_1 = \Delta_2$

   d. None of these

Chapter 5:Continuity and Differentiability

Section-A (Multiple Choice Questions)

Q.1 Let $f(x) = \begin{cases} x + a & x < 1 \\ ax^2 + 1 & x \geq 1 \end{cases}$, then f(x) is continuous at x=1 for

    a) a = 0   b) a = 1   c) all a ∈ R   d) none of these

Q.2 If $f(x) = x^2 \sin \frac{1}{x}$, where x ≠ 0 , then value of the function f at x = 0 , so that the function is continuous at x = 0 is

    a) 0   b) 1   c) - 1   d) none of these

Q.3 The function f(x) = tan x is discontinuous on the set

    a) $\{ n\pi : n \in Z \}$ b) $\{ 2n\pi : n \in Z \}$ c) $\{ (2n+1)\frac{\pi}{2} : n \in Z \}$ d) $\{ \frac{n\pi}{2} : n \in Z \}$

Q.4 The function f(x) = [x] , where [x] denotes the greatest integer function is continuous at

    a) 4   b) – 2   c) 1   d) 1.5

Q.5 The function $e^{|x|}$ is

    a) Continuous everywhere but not differential at x = 0.

    b) Continuous and differentiable everywhere

    c) Not continuous at x = 0.

    d) None of these

Q.6 The set of points, where the function f given by $f(x) = |x - 1|$ is differentiable is

    a) R   b) R – {1}   c) (0 , ∞)   d) none of these

Q.7 A function f(x) is said to be continuous for x∈ R , if

    a) f(x) is continuous at x = 0.

    b) f(x) is differentiable at x = 0.

    c) f(x) is continuous at two points.

    d) f(x) is differentiable for x ∈ R

Q.8 If $y = \sqrt{\sin x + y}$, then $\frac{dy}{dx}$ is equal to

    a) $\frac{\cos x}{2y - 1}$ b) $\frac{\cos x}{1 - 2y}$ c) $\frac{\sin x}{1 - 2y}$ d) $\frac{\sin x}{2y - 1}$

Q.9 If $x\sqrt{1 + y} + y \sqrt{1 + x} = 0$, then $\frac{dy}{dx}$

    a) $\frac{x}{x + 1}$ b) $\frac{1}{x + 1}$ c) $\frac{-1}{(1 + x)^2}$ d) $\frac{x + 1}{x}$

Q.10 If $x \sin (a + y) = \sin y$ then $\frac{dy}{dx}$ is equal to

    a) $\frac{\sin^2 (a+y)}{\sin a}$ b) $\frac{\sin a}{\sin^2(a+y)}$ c) $\frac{\sin(a+y)}{\sin a}$ d) $\frac{\sin a}{\sin(a+y)}$

Q.11 If $ax^2 + 2hxy + by^2 = 1$ then $\frac{dy}{dx}$ equals

    a) $\frac{hx+by}{ax+by}$ b) $\frac{ax+by}{hx+by}$ c) $\frac{ax+hy}{hx+by}$ d) $-\frac{ax+hy}{hx+by}$

Q.12 Differential coefficient of sec ($\tan^{-1} x$) w.r.t. x is

    a) $\frac{x}{\sqrt{x^2+1}}$ b) $\frac{x}{1+x^2}$ c) $x \sqrt{1 + x^2}$ d) $\frac{1}{\sqrt{x^2+1}}$

Q.13 If $y = \sin^{-1}(\frac{\sqrt{x}-1}{\sqrt{x}+1}) + \sec^{-1}(\frac{\sqrt{x}+1}{\sqrt{x}-1})$, x > 0 then $\frac{dy}{dx}$ is equal to

    a) 1   b) 0   c) $\frac{\pi}{2}$ d) none of these