



INDIAN SCHOOL AL WADI AL KABIR
CLASS XII UNIT TEST -I 2021-2022
E-EXAMINATION

1. Set A has 4 elements and the set B has 5 elements. Then the number of injective functions that can be defined from set A to set B is
(a) 144 (b) 120 (c) 240 (d) 60

Answer: b

Explanation: total injective mappings/functions = ${}^5P_4 = 5! = 120$.

2. Let $f: \mathbb{R} - \left\{\frac{3}{5}\right\} \rightarrow \mathbb{R}$ be defined by $f(x) = \frac{3x+2}{5x-3}$, then
(a) $f^{-1}(x) = f(x)$ (b) $f^{-1}(x) = -f(x)$ (c) $(f \circ f)(x) = -x$
(d) $f^{-1}(x) = \frac{1}{5}f(x)$

Ans: (a) $f^{-1}(x) = f(x)$

3. Let $f: [2, \infty) \rightarrow \mathbb{R}$ be the function defined by $f(x) = x^2 - 4x + 5$, then the range of f is
(a) \mathbb{R} (b) $[2, \infty)$ (c) $[1, \infty)$ (d) $[-2, \infty)$

Ans: (c) $[1, \infty)$

4. Let T be a relation defined on the set \mathbb{R} of real numbers and $T = \{(a, b): 1 + ab < 0, a, b \in \mathbb{R}\}$. Among the given ordered pairs (1, 1), (1, 2), (1, -2), (2, 2), the only pair that belongs to T is

- (a) (1, 1) (b) (1, 2) (c) (1, -2) (d) (2, 2)

Ans: (c) (1, -2)

5. Let $f: \mathbb{R} \rightarrow [-5, \infty)$ defined by $f(x) = 9x^2 + 6x - 5$ and is invertible, then find $f^{-1}(43)$

- (a) 0 (b) 1 (c) 2 (d) 3

Ans: (c) 2

6. If $f, g: \mathbf{R} \rightarrow \mathbf{R}$ be two functions defined as $f(x) = |x| + x$ and $g(x) = |x| - x, \forall x \in \mathbf{R}$, then $(f \circ g)(-1)$ is

- (a) 0 (b) -1 (c) 2 (d) 4

Ans: (d) 4

7. If f be the greatest integer function and g be the modulus function. Find the value of $g \circ f\left(\frac{-1}{3}\right) - f \circ g\left(\frac{-1}{3}\right)$

- (a) 0 (b) 1 (c) -1 (d) 2

Ans: (b) 1

8. Let $A = \{-1, 0, 1, 2\}$ and $B = \{x, y, z\}$. Then number of one-one functions from A to B are

- (a) 0 (b) 4 (c) 6 (d) 24

Answer ; (a) 0 as $n(A)$ greater than $n(B)$

9. If $f: \mathbf{R} \rightarrow \mathbf{R}$ is a function defined as $f(x) = 3x - 2$, then $f[f(x)]$ is

- (a) $9x + 8$ (b) $9x - 8$ (c) $3x - 2$ (d) $9x - 2$

Ans: (b) $9x - 8$

10. If $f: \mathbf{R} \rightarrow \mathbf{R}$, $g: \mathbf{R} \rightarrow \mathbf{R}$ and $h: \mathbf{R} \rightarrow \mathbf{R}$ are such that $f(x) = x^2$, $g(x) = \tan x$ and $h(x) = \log x$, then the value of $\{g \circ (f \circ h)\}(1)$ is

- (a) 0 (b) 1 (c) -1 (d) π

Answer: (a) 0

11. The maximum number of equivalence relations on the set $A = \{a, b, c\}$ are

- (a) 1 (b) 2 (c) 3 (d) 5

Answer: (d) 5

12. Which of the following functions from Z into Z are bijective?

- (a) $f(x) = x^3$ (b) $f(x) = x + 2$ (c) $f(x) = 2x + 1$ (d) $f(x) = x^2 + 1$

Answer: (b) $f(x) = x + 2$

13. Let $f: \mathbf{R} \rightarrow \mathbf{R}$ be the functions defined by $f(x) = x^5 + 5$. Then $f^{-1}(x)$ is

- (a) $(x + 5)^{\frac{1}{5}}$ (b) $(x - 5)^{\frac{1}{5}}$ (c) $(5 - x)^{\frac{1}{5}}$ (d) $5 - x$

Answer: (b) $(x - 5)^{\frac{1}{5}}$

14. Let $C = \{(a, b) : a^2 + b^2 = 1; a, b \in \mathbb{R}\}$ is a relation on \mathbb{R} , the set of real numbers, then C is

- (a) an equivalence relation (b) Reflexive (c) Transitive (d) Symmetric

Ans: (d) Symmetric

15. $\sin^{-1}[\sin(\frac{2\pi}{3})]$ is equal to

- (a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{3}$ (c) $\frac{-\pi}{3}$ (d) π

Ans: (b) $\frac{\pi}{3}$

16. If $\cos^{-1}x - \sin^{-1}x = 0$, then x is equal to

- (a) 0 (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{-\pi}{3}$ (d) π

Ans: (b) $\frac{1}{\sqrt{2}}$

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

- (a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{-\pi}{2}$ (d) π

Ans: (c) $\frac{-\pi}{2}$

18. The domain of the function $\sin^{-1} x$ is

- (a) $[-1, 1]$ (b) $(-1, 1)$ (c) $[-\infty, +\infty]$ (d) $[0, 1]$

Ans: (a) $[-1, 1]$

19. If $\tan^{-1} x - \cot^{-1} x = \frac{\pi}{6}$, then x is

- (a) $\sqrt{3}$ (b) $-\sqrt{3}$ (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{-1}{\sqrt{3}}$

Ans: (a) $\sqrt{3}$

20. If $\sec^{-1} x + \sec^{-1} y = \frac{\pi}{2}$, then the value of $\operatorname{cosec}^{-1}x + \operatorname{cosec}^{-1}y$ is

- (a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{-\pi}{2}$ (d) π

Ans: (b) $\frac{\pi}{2}$

21. If $\sin^{-1}x = \sin^{-1}y = \sin^{-1}z = \frac{\pi}{2}$, then the value of $x + y^2 + z^3$ is

- (a) 1 (b) 2 (c) 3 (d) 4

Ans: (c) 3

22. If $\sin(\sin^{-1}\frac{2}{3} + \cos^{-1}x) = 1$ then find the value of x

- (a) $\frac{2}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{3}{2}$ (d) $\frac{-3}{2}$

Ans: (a) $\frac{2}{3}$

23. The value of $\text{Cot}(\frac{\pi}{4} - 2 \cot^{-1} 2)$ is

- (a) -5 (b) 5 (c) 7 (d) -7

Ans: (d) -7

24. If $y = \sqrt{\sin x + y^3}$, then $\frac{dy}{dx}$ is equal to

- (a) $\frac{\cos x}{y(2-3y)}$ (b) $\frac{\cos x}{y(1-2y)}$ (c) $\frac{\sin x}{y(2-3y)}$ (d) $\frac{\sin x}{2y-1}$

Ans: (a) $\frac{\cos x}{y(2-3y)}$

25. If $xy^2 = ax + bxy + y^2$, then find $\frac{dy}{dx}$

- (a) $\frac{2ax + by + y^2}{2xy + bx + 2y}$ (b) $\frac{2ax + by - y^2}{2xy - bx - 2y}$ (c) $\frac{a + by - y^2}{2xy - bx - 2y}$ (d) $\frac{2ax + by + y^2}{2xy + bx + 2xy}$

Ans (c) $\frac{a + by - y^2}{2xy - bx - 2y}$

26. Find the value of k for which the following function is continuous at $x = 2$

$$f(x) = \begin{cases} 2x + 1; & x < 2 \\ k & ; x = 2 \\ 3x - 1; & x > 2 \end{cases}$$

- (a) -5 (b) 5 (c) 7 (d) -7

Ans: (b) 5

27. Derivative of $\log(\log x)^2$ with respect to x is

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

Ans: (a) $\frac{2}{x \log x}$

Case Study Question

In two different societies, there are some school going students - including girls as well as boys. Satish forms two sets with these students, as his college project. Let $A = \{a_1, a_2, a_3, a_4, a_5, a_6\}$ and $B = \{b_1, b_2, b_3, b_4, b_5\}$ where a_1, a_2, a_3, a_4, a_5 and b_1, b_2, b_3, b_4 are the school going students of first and second society respectively. Satish decides to explore these sets for various types of relations and functions. Using the information given above, answer the following

28. Satish wishes to know the number of reflexive relations defined on set A. How many such relations are possible?

- (a) 0 (b) 2^{10} (c) 2^{20} (d) 2^{30}

29. Let $R: A \rightarrow A$, $R = \{(x, y): x \text{ and } y \text{ are students of same gender}\}$. Then relation R is

- (a) reflexive only (b) reflexive and symmetric but not transitive
(c) reflexive and transitive but not symmetric (d) an equivalence relation

30. Let $R: A \rightarrow B$, $R = \{(a_1, b_1), (a_1, b_2), (a_2, b_1), (a_3, b_3), (a_4, b_2), (a_5, b_2)\}$, then R is

- (a) neither one-one nor onto (b) one-one but, not onto
(c) only onto, but not one-one (d) one-one and onto both

28 (d) 2^{30}

29 (d) an equivalence relation

30 (a) neither one-one nor onto

