

Only One Choice Correct:

1. Find the domain of definition for $f(x) = \sqrt{\log_{0.4} \left(\frac{x-1}{x+5} \right)}$
- (a) $x \in (-5, 1)$ (b) $x \in (1, \infty)$
(c) $x \in (-5, \infty)$ (d) $x \in (-\infty, -5)$
2. Find the domain of function $f(x) = \sin^{-1} \left(\frac{1+x^2}{2x} \right)$
- (a) $x \in \{-1, 1\}$ (b) $x \in (-1, 1)$
(c) $x \in [-1, 1]$ (d) none of these
3. The range of function $f(x) = x \operatorname{sgn} x$, where $\operatorname{sgn}(x)$ is a signum function.
- (a) $(0, \infty)$ (b) $x \in (1, \infty)$
(c) $\{-1, 0, 1\}$ (d) $[0, \infty)$
4. The total number of solution for $x = 1 + [x]$ is
- (a) one (b) two
(c) three (d) none
5. The range of function $f(x) = \frac{\{x\}}{1+[x]}$ is
- (a) $[0, \infty)$ (b) $[0, 1)$
(c) $[0, \frac{1}{2})$ (d) $[\frac{1}{2}, 1)$
6. The function $f(x) = \frac{x(\sin x + \tan x)}{\left[\frac{x+\pi}{\pi} \right] - \frac{1}{2}}$, (where $x \neq n\pi$) is a/ an
- (a) Even function (b) Odd function
(c) Neither odd nor even (d) Periodic function
7. The period of $f(x) = \tan 3x + \sin \left(\frac{x}{3} \right)$
- (a) 6π (b) 2π
(c) $\frac{2\pi}{3}$ (d) 3π
8. For two non empty sets A and B, having m and n elements ($m \leq n$), find total number of injective mapping possible.
- (a) n^m (b) ${}^n P_m$
(c) $n!$ (d) None

More than one correct choices

9. If $f : N \rightarrow N$, $f(x) = (-1)^{[p]}$ (where $p = \{x\}$, $\{x\}$ represents fractional part of x ,

$[x]$ represents greater integer function) is

- (a) onto function (a) into function
(c) one- one function (d) many- one function

10. If $f_1(x)$ and $f_2(x)$ are defined on Domain D_1 and D_2 , respectively then $f_1(x)$ and $f_2(x)$ is defined on

- (a) $D_1 \cap D_2$ (b) $D_1 \cup D_2$
(c) $D_1 - D_2$ (d) None

11. If $f : \left[0, \frac{5}{2}\right) \rightarrow \left(\frac{1}{2}, 3\right]$ such that $f(x) = \frac{[x]+1}{\{x\}+1}$, where $\{x\}$ represents fractional part of x

$[x]$ represents greater integer function of x

- (a) $f(x)$ is onto (b) $f(x)$ is into
(c) $\max(f(x)) = 3$ (d) $f(x)$ is injective function

12. The function $f(x) = \left(\frac{a^x - 1}{a^x + 1}\right)x$ is a/an

- (a) Odd function (b) Even function
(c) Many one function (d) one- one function

True/ False (For true fill (a) and for false fill (b))

13. A function $f(x)$ is monotonic function i.e. increasing or decreasing function for $x \in R$. It is always a one- one function

14. $|y| = \sin x$ is an inverse function of $y = \sin|x|$.

15. A periodic function is always many- one function.

Fill in the blanks:

16. If $f(x)$ is an even function and $g(x)$ is an odd function then $f(g(x))$ is a/an _____

17. If f is monotonic function and g is periodic function with p , the period of $f(g(2x+7))$ is _____

23. **A:** If $f(x) = (x^{12} - x^9 + x^4 - x + 1)^{\frac{1}{2}}$ the domain of definition is $(-\infty, \infty)$.
R: Domain of $\log_{10} \log_{10}(1 + x^3)$ is $(0, \infty)$
24. **A:** If $f : (-\infty, 1] \rightarrow (-\infty, 1]$, for $f(x) = x(2 - x)$ the inverse function $f^{-1}(x)$ is $1 - \sqrt{1 - x}$.
R: The period of the function $\left| \sin \frac{x}{2} \right| + |\cos x|$ is π
25. **A:** The range of the function $f(x) = x^2 + \frac{1}{x^2 + 1}$ is $(-\infty, 4]$.
R: If $f(x) = x^n, n \in N$ and $g \circ f(x) = ng(x)$, then $g(x)$ can be $\log|x|$.
26. **A:** Let f and g be functions defined by $f(x) = \frac{x}{x+1}$ and $g(x) = \frac{x}{1-x}$, then $g \circ f^{-1}(x)$ is equal to $2x$.
R: The inverse of the function $y = \log(x + \sqrt{x^2 + a^2}) (a > 0, a \neq 1)$ is $y = \frac{(a^x - a^{-x})}{2}$
27. **A:** The set X has 3 elements and the set Y has 4 elements. The number of injections that can be defined from X to Y is 24.
R: Let set X has 10 distinct elements, then total number of distinct functions from X to X is 10^3 .

Match List I with List II :

List I

List II

(a) 0

28. If $2f(x) + 3f(-x) = x^2 - x + 1$, the value of $f'(1)$ is equal to

(b) $\frac{7}{5}$

29. The number of surjections from $A = \{1, 2, 3, 4, \dots, n\}, n \geq 2$ onto $B = \{a, b\}$ is

(c) $2^n - 2$

30. If the period of $f(x) = \frac{\sin(nx)}{\sin\left(\frac{x}{n}\right)}$ be 4π .

(d) None of these