# MATHS

## BOOKS - CENGAGE MATHS (ENGLISH)

## FUNCTIONS

### Single Correct Answer Type

**1.** $f(x) = \sin[x] + [\sin x], 0 < x < \frac{\pi}{2}$ (where [.] represents the greatest integer function), can also be represented as

A. $\begin{cases} 0, & 0 < x < 1 \\ 1 + \sin 1, & 1 \leq x < \frac{\pi}{4} \end{cases}$

B. $\begin{cases} \frac{1}{\sqrt{2}}, & 0 < x < \frac{\pi}{4} \\ 1 + \frac{1}{2} + \frac{1}{\sqrt{2}} + \frac{\sqrt{3}}{2}, & \frac{\pi}{4} \leq x < \frac{\pi}{4} \end{cases}$

C. $\begin{cases} 0, & 0 < x < 1 \\ \sin 1, & 1 \leq x < \frac{\pi}{2} \end{cases}$

D. $\begin{cases} 0, & 0 < x < \frac{\pi}{2} \\ 1, & \frac{\pi}{4} < x < 1 \\ \sin 1, & 1 \leq x \leq \frac{\pi}{4} \end{cases}$

**Answer: C**

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**2.** If $\phi(x) = \frac{1}{1+e^{-x}}$ $S = \phi(5) + \phi(4) + \phi(3) + .. + \phi(-3) + \phi(-4) + \phi(-5)$ then the value of S is

A. 5

B. $11/2$

C. 6

D. $13/2$

**Answer: B**

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**3.** For non-negative integers m and n a function is defined as follows: f(m,n)={n+1,ifm=0andf(m−1,1)ifm≠0,n=0andf(m−1,f(m,n−1))ifm≠0,n≠0}Then the value of f(1,1) is:

A. 1

B. 2

C. 3

D. 4

**Answer: C**

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**4.** If $f: R \to Q$ (Rational numbers), $g: R \to Q$ (Rational numbers) are two continuous functions such that $\sqrt{3}f(x) + g(x) = 4$ then $(1 - f(x))^3 + (g(x) - 3)^3$ is equal to (1) 1 (2)2 (3) 3 (4) 4

A. 1

B. 2

C. 3

D. 4

**Answer: B**

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**5.** If $f and g$ are two functions defined on $N$, such that $f(n) - \{2n - 1 \text{ if } n is even 2n + 2 \text{ if } n is odd$ and $g(n) = f(n) + f(n + 1)$. Then range of $g$ is $\{m \in N : m =$ multiple of 4$\}$ { set of even natural numbers} $\{m \in N : m = 4k + 3, k$ is a natural number $\{m \in N : m =$ multiple of 3 or multiple of 4$\}$

A. { m $\in$ N : m = multiple of 4}

B. { set of even natural numbers}

C. {m $\in$ N : m = 4k + 3, k is a natural number}

D. {m $\in$ N : m = multiple of 3 or multiple of 4}

**Answer: C**

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**6.** The number of points on the real line where the function $f(x) = \log_{|x^2-1|}|x-3|$ is not defined is

A. 4

B. 5

C. 6

D. 7

**Answer: C**

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**7.** For relation $2\log y - \log x - \log(y-1)$=0

A. domain $= (4, +\infty)$, range $= (1 + \infty)$

B. domain $= (4, \infty)$, range $= (2 + \infty)$

C. domain $= (2, \infty)$, range $= (2, +\infty)$

D. none of these

**Answer: A**

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**8.** The range of the function $y = \left[x^2\right] - [x]^2\ x \in [0, 2]$ (where [] denotes the greatest integer function), is

A. [0]

B. [0,1]

C. [1,2]

D. [0,1,2]

**Answer: D**

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**9.** The number of elements in the domain of the function $f(x) = \sin^{-1}\left(\frac{x^2 - 2x}{3}\right) + \sqrt{([x] + [-x])}$, (where [.] denotes the greater integer function) is equal to a. 4 b. 6 c. 3 d. 5

A. 6

B. 4

C. 3

D. 5

**Answer: D**

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**10.** Range of the function $f(x) = \sqrt{\cos^{-1}\left(\sqrt{\log_4 x}\right) - \frac{\pi}{2}} + \sin^{-1}\left(\frac{1 + x^2}{4x}\right)$ is equal to

(A) $\left(0, \frac{\pi}{2} + \sqrt{\frac{\pi}{2}}\right]$

(B) $\left[\frac{\pi}{2}, \frac{\pi}{2} + \sqrt{\frac{\pi}{2}}\right]$

(C) $\left[\frac{\pi}{6}, \frac{\pi}{4}\right)$

(D) $\left\{\frac{\pi}{6}\right\}$

A. $\left(0, \frac{\pi}{2} + \sqrt{\frac{\pi}{2}}\right]$

B. $\left[\frac{\pi}{2}, \frac{\pi}{2} + \sqrt{\frac{\pi}{2}}\right]$

C. $\left[\frac{\pi}{6}, \frac{\pi}{2}\right]$

D. $\left\{\frac{\pi}{6}\right\}$

**Answer: D**

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**11.** The range of the function $f(x) = \tan^{-1}\left(\frac{x^2+1}{x^2+\sqrt{3}}\right)$ $x \in R$ is

A. $\left[\frac{\pi}{6}, \frac{\pi}{2}\right)$

B. $\left[\frac{\pi}{6}, \frac{\pi}{3}\right)$

C. $\left[\frac{\pi}{6}, \frac{\pi}{4}\right)$

D. none of these

**Answer: C**

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**12.** The domain of the function $f(x) = \sqrt{10 - \sqrt{x^4 - 21x^2}}$ is

a) $[5, \infty)$

b. $[-\sqrt{21}, \sqrt{21}]$

c. $[-5, -\sqrt{21}] \cup [\sqrt{21}, 5] \cup \{0\}$

d. $(-\infty, -5)$

A. $[5, \infty]$

B. $[-\sqrt{21}, \sqrt{21}]$

C. $[-5 - \sqrt{21}] \cup [\sqrt{21}, 5)] \cup \{0\}$

D. $(-\infty, -5)$

**Answer: C**

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**13.** Number of integers in domain of function $f(x) = \log_{|x^2|}(4 - |x|) + \log_2\{\sqrt{x}\}$ is

a) 0

b) 1

c) 2

d) 3

A. 0

B. 1

C. 2

D. 3

**Answer: C**

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**14.** The domain of the function $f(x) = \log_e\{sgn(9 - x^2)\} + \sqrt{[x]^3 - 4[x]}$(where [] represents the greatest integer function is

A. $[-2, 1) \cup [2.3)$

B. $[-4, 1) \cup [2, 3)$

C. $94, 1) \cup [2, 3)$

D. $[2, 1) \cup [2, 3)$

**Answer: A**

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**15.** Number of integers in the integer of $f(x) = \frac{1}{\pi}\left(\sin^{-1} x + \tan^{-1} x\right) + \frac{x+1}{x^2+2x+5}$ is 0 b. 3 c. 2 d. 1

A. 0

B. 3

C. 2

D. 1

**Answer: C**

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**16.** Let $G(x) = \left(\frac{1}{a^x - 1} + \frac{1}{2}\right)F(x),$ where a is a positive real number not equal to 1 and $f(x)$ is an odd function. Which of the following statements is true? $G(x)$ is an odd function $G(x)is$ an even function $G(x)$ is neither even nor odd function. Whether $G(x)$ is an odd or even function depends on the value of a

A. G(x) is an odd function

B. G(x) is an even function

C. G(x) is neither even function nor odd function

D. Whether G(x) is an odd function or an even function, it depends on the value of a

**Answer: B**

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**17.** Let $f(x) = \left([a]^2 - 5[a] + 4\right)x^3 - \left(6\{a\}^2 - 5\{a\} + 1\right)x - (\tan x) \times \text{sgn}\ \ x$ be an even function for all $x \in R$. Then the sum of all possible values of a is (where $[\cdot]$ and $\{\cdot\}$ denote greatest integer function and fractional part function, respectively)

A. $\frac{17}{6}$

B. $\frac{53}{6}$

C. $\frac{31}{3}$

D. $\frac{35}{3}$

**Answer: D**

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**18.** $f(x) = \sin^2 x + \cos^4 x + 2$ and $g(x) = \cos(\cos x) + \cos(\sin x)$ Also let period f(x) and g(x) be $T_1$ and $T_2$ respectively then

A. $T_1 = 2T_2$

B. $2T_1 = T_2$

C. $T_1 = T_2$

D. $T_1 = 4T_2$

**Answer: C**

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**19.** A continuous, even periodic function f with period 8 is such that $f(0) = 0, f(1) = -2, f(2) = 1, f(3) = 2, f(4) = 3,$ then the value of $\tan^{-1}\tan\{f(-5) + f(20) + \cos^{-1}(f(-10)) + f(17)\}$ is equal to

A. $2\pi - 3$

B. $3 - 2\pi$

C. $2\pi + 3$

D. $3 - \pi$

**Answer: D**

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**20.** If a and b are natural numbers and $f(x) = \sin\left(\sqrt{a^2 - 3}\right)x + \cos\left(\sqrt{b^2 + 7}\right)x$ is periodic with finite fundamental period then period of f(x) is

A. $\pi$

B. $2\pi$

C. $2\pi\left(\sqrt{a^2 - 3} + \sqrt{b^2 + 7}\right)$

D. $\pi\left(\sqrt{a^2 - 3} + \sqrt{b^2 + 7}\right)$

**Answer: B**

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**21.** Period of $f(x) = \sin 3x \cos[3x] - \cos 3x \sin[3x]$ (where[] denotes the greatest integer function), is

A. $1/6$

B. $2/3$

C. $5/6$

D. $1/3$

**Answer: D**

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**22.** What is the fundamental period of $f(x) = \dfrac{\sin x + \sin 3x}{\cos x + \cos 3x}$

A. $\pi/2$

B. $\pi$

C. $2\pi$

D. $3\pi$

**Answer: B**

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**23.** If $f: R \to R$ is a function satisfying the property $f(x+1)+f(x+3)=2$ for all $x \in R$ than $f$ is

A. periodic with period 3

B. periodic with period 4

C. non periodic

D. periodic with period 5

**Answer: B**

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**24.** Period of $f(x) = sgn([x] + [-x])$is equal to (where [.] denotes greatest integer function

A. 1

B. 2

C. 3

D. does not exist

**Answer: A**

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**25.** If $F(x)$ and $G(x)$ are even and odd extensions of the functions $f(x) = x|x| + \sin|x| + xe^x$, where $x \in (0, 1)$, $g(x) = \cos|x| + x^2 - x$, is where $x \in (0, 1)$ respectively to the ars interval $(-1, 0)$ then $F(x) + G(x)$in $(-1, 0)$ is

A. $\sin x + \cos x + xe^{-x}$

B. $-\left(\sin x + \cos x + xe^{-x}\right)$

C. $-\left(\sin x + \cos x + x + xe^{-x}\right)$

D. $-\left(\sin x + \cos x + x^2 + xe^{-x}\right)$

**Answer: C**

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**26.** Let $P(x) = x^{10} + a_2x^8 + a_3x^6 + a_4x^4 + a_5x^2$ be a polynomial with real coefficients. If $P(1) = 1$ and $P(2) = -5$, then the minimum-number of distinct real zeroes of $P(x)$ is

A. 5

B. 6

C. 7

D. 8

**Answer: A**

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**27.** Let $f: R \to [1, \infty)$ be defined as $f(x) = \log_{10}\left(\sqrt{3x^2 - 4x + k + 1} + 10\right)$ If f(x) is surjective then k =

A. $k = \frac{1}{3}$

B. $k < \frac{1}{3}$

C. $k > \frac{1}{3}$

D. $k = 1$

**Answer: A**

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**28.** about to only mathematics

A. injective but not surjective

B. injective as well as surjective

C. neither injective nor surjective

D. surjective but injective

**Answer: B**

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**29.** about to only mathematics

A. a bijection

B. one-one but not onto

C. onto but not one-one

D. neither one-one nor onto

**Answer: A**

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**30.** $f: R \to R$ defined by $f(x) = \frac{1}{2}x|x| + \cos + 1$ is

A. one-one and onto

B. one-one and into

C. many-one and onto

D. many-one and into

**Answer: A**

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**31.** about to only mathematics

A. $[1, 4]$

B. $[-2, 3]$

C. $(0, 3]$

D. $[2, 5\}$

**Answer: C**

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**32.** Let $f: R \to \left(0, \frac{2\pi}{3}\right]$ defined as $f(x) = \cot^{-1}\left(x^2 - 4x + \alpha\right)$ Then the smallest integral value of $\alpha$ such that, $f(x)$ is into function is

A. 2

B. 4

C. 6

D. 8

**Answer: B**

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**33.** about to only mathematics

A. many-one and onto

B. many-one and into

C. one-one and onto

D. one-one and into

**Answer: B**

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**34.** Which of the following statements are incorrect? $I$. If $f(x)$ and $g(x)$ are one-one then $f(x)+g(x)$ is also one-one. $II$. If $f(x)$ and $g(x)$ are one-one then $f(x)\dot{g}(x)$ is also one-one. $III$. If $f(x)$ is odd then it is necessarily one-one? $IandIIonly$ $b.\ IIandIIIonly$ $c.\ IIIandIonly$ d. $I, IIandIII$

A. I and II only

B. II and III only

C. III and I only

D. I, II and III

**Answer: D**

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**35.** Which of the following functions is one-one ? $(1) f: R \to R$ defined as $f(x) = e^{sgnx} + e^{x^2}$ $(2) f: [-1, \infty) \to (0, \infty)$ defined by $f(x) = e^{x^2 + |x|}$ $(3) f: [3, 4] \to [4, 6]$ defined by $f(x) = |x - 1| + |x - 2| + |x - 3| + x - 4|$

$(4) f(x) = \sqrt{\ln(\cos(\sin x))}$

A. $f: R \to R$ denined as $f(x) = d^{\text{sgn x}} + d^{x^2}$

B. $f: [-1, \infty) \to (0, \infty)$ defined by $f(x) = e^{x^2 + |x|}$

C.

$f: [3, 4] \to [4, 6]$ defined by $f(x) = |x - 1| + |x - 2| + |x - 3| + |$

D. $f(x) = \sqrt{\ln(\cos(\sin x))}$

**Answer: C**

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**36.** about to only mathematics

A. $-1$

B. $0$

C. 1

D. 100

**Answer: D**

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**37.** If $f(x) = x^2 + x + \frac{3}{4}$ and $g(x) = x^2 + ax + 1$ be two real functions, then the range of $a$ for which $g(f(x)) = 0$ has no real solution is $(-\infty, -2)$ b. $(-2, 2)$ c. $(-2, \infty)$ d. $(2, \infty)$

A. $(-\infty, -2)$

B. $(-2, 2)$

C. $(-2, \infty)$

D. $(2, \infty)$

**Answer: C**

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**38.** If domain of $f(x)$ is $[1, 3]$, then the domain of $f\left(\log_2\left(x^2 + 3x - 2\right)\right)$ is

A. $[-5, -4] \cup [1, 2]$

B. $[-13, -2] \cup \left[\frac{3}{5}, 5\right]$

C. $[4, 1] \cup [2, 7]$

D. $[-3, 2]$

**Answer: A**

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**39.** Let $f(x) = \frac{x}{1+x}$ and $g(x) = \frac{rx}{1-x}$. Let S be the set of all real numbers r , such that f(g(x))=g(f(x)) for infinitely many real numbers x. The number of elements in set S is

A. 1

B. 2

C. 3

D. 5

**Answer: B**

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**40.** Let $f(x) = \frac{ax + b}{cx + d}$. Then the $fof(x) = x$, provided that : $(a \neq 0, b \neq 0, c \neq 0, d \neq 0)$

A. $d = -a$

B. $d = a$

C. $a = b = 1$

D. $a = b = c = d = 1,$

**Answer: A**

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**41.** If $f: R \to R$ , $f(x) = x^3 + 3$,and $g: R \to R$,$g(x) = 2x + 1$, then $f^{-1}\left(g^{-1}(23)\right)$ equals

A. 2

B. 3

C. $(14)^{1/3}$

D. $(15)^{1/3}$

**Answer: A**

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**42.** If $f(x) = x(x-1)$ is a function from $\left[\frac{1}{2}, \infty\right) \to \left[-\frac{1}{4}, \infty\right)$, then $\left\{x \in r : f^{-1}(x) = f(x)\right\}$ is a. null set b. $\{0, 2\}$ c. $\{2\}$ d. a set containing 3 elements

A. null set

B. $\{0, 2\}$

C. $\{2\}$

D. a set containing 3 elements

**Answer: C**

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**43.** Let $a > 1$ be a real number and $f(x) = \log_a x^2 \quad \text{for} \quad x > 0.$ If $f^{-1}$ is the inverse function fo f and b and c are real numbers then $f^{-1}(b + c)$ is equal to

A. $f^{-1}(b).\, f^{-1}(c)$

B. $f^{-1}(b) + f^{-1}(c)$

C. $\dfrac{1}{f(b + c)}$

D. $\dfrac{1}{f^{-1}(b) + f^{-1}(c)}$

**Answer: A**

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**44.** If the function $f(x) = \{x + 1 \text{ if } x \leq 1\ ,\ 2x + 1 \text{ if } 1 < x \leq 2$ and $g(x) = \{x^2 \text{ if } -1 \leq x \leq 2,\ x + 2 \quad \text{if} \quad 2 \leq x \leq 3$ then the number of roots of the equation $f(g(x)) = 2$

A. 4

B. 3

C. 2

D. 1

**Answer: C**

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**45.** Suppose $f(x) = ax + b and g(x) = bx + a, where a and b$ are positive integers. If $f(g(20)) - g(f(20)) = 28,$ then which of the following is not true? $a = 15$ b. $a = 6$ c. $b = 14$ d. $b = 3$

A. $a = 15$

B. $a = 6$

C. $b = 14$

D. $b = 3$

**Answer: D**

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**46.** If $f(x)$ is an invertible function and $g(x) = 2f(x) + 5$, then the value of $g^{-1}(x) is$ (a)$2f^{-1}(x) - 5$ (b) $\frac{1}{2f^{-1}(x) + 5}$ $\frac{1}{2}f^{-1}(x) + 5$ (d) $f^{-1}\left(\frac{x-5}{2}\right)$

A. $2f^{-1}(x) - 5$

B. $\frac{1}{2f^{-1}(x) + 5}$

C. $\frac{1}{2}f^{-1}(x) + 5$

D. $f^{-1}\left(\frac{x-5}{2}\right)$

**Answer: D**

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**47.** If $f(x) = \begin{cases} -x + 1, & x \leq 0 \\ -(x-1)^2, & x \geq 1 \end{cases}$ ,then the number of solutions of $f(x) - f^{-1}(x) = 0$ is

A. 0

B. 2

C. 3

D. 4

**Answer: D**

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**48.** about to only mathematics

A. $-1$

B. 0

C. 1

D. none of these

**Answer: B**

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**49.** If $f\left(x^2-6x+6\right)+f\left(x^2-4x+4\right)=2x, \forall x \in R$ then $f(-3)+f(9)-5f(1)=?$ (A) 7 (B) 8 (C) 9 (D) 10

A. 7

B. 8

C. 9

D. 10

**Answer: C**

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**50.** about to only mathematics

A. 1

B. 3

C. $-1$

D. none of these

**Answer: C**

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**51.** If $f: R \to R$ is a function satisfying $f(x+y) = f(xy)$ for all $x, y$ in $R$ and $f\left(\frac{3}{4}\right) = \frac{3}{4}$, then $f\left(\frac{9}{16}\right)$ is a.$\frac{3}{4}$ b. $\frac{9}{16}$ c. $\frac{\sqrt{3}}{2}$ d. 0

A. $\frac{3}{4}$

B. $\frac{9}{16}$

C. $\frac{\sqrt{3}}{2}$

D. $0$

**Answer: A**

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**52.** A function $f: R \to R$ satisfy the equation $f(x)f(y) - f(xy) = x + y$ for all $x, y \in R$ and $f(y) > 0$, then

A. $f(x)f^{-1}(x) = x^2 - 4$

B. $f(x)f^{-1}(x) = x^2 - 6$

C. $f(x)f^{-1}(x) = x^2 - 1$

D. none of these

**Answer: C**

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**53.** Let f be a function defined from $R^+ \to R^+$. If $(f(xy))^2 = x(f(y))^2$ for all positive numbers x and y, If $f(2) = 6,$ find $f(50)$=?

A. 20

B. 30

C. 5

D. 40

**Answer: B**

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**54.** Suppose $f$ is a real function satisfying $f(x+f(x))=4f(x) and f(1)=4$. Then the value of $f(21)$ is 16 21 64 105

A. 16

B. 64

C. 4

D. 44

**Answer: B**

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**55.** The graph of a function $y=g(x)$ is shown in the following figure. If $f(x)=-3x^2-kx-12, k \in R and f(g(x))>0 \forall x \in R$ then lest integral value of $k$ is equal to a. b. c. d.

A. 13

B. 14

C. 15

D. 16

**Answer: C**

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**56.** Let $f: I \overrightarrow{I}$ be a function ($I$ is set of integers) such that $f(0) = 1, f(f(n) = f(f(n+2)+2) = n$. then $f(3) = 0$ b. $f(2) = 0$ c. $f(3 = -2)$ d. $f$ is many one function

A. $f(3) = 0$

B. $f(2) = 0$

C. $f(3) = -2$

D. f is many -one function

**Answer: C**

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## Multiple Correct Answers Type

**1.** The function $f(x) = \cos^{-1}\left(\frac{2[|\sin x| + |\cos x|]}{\sin^2 x + 2\sin x + \frac{11}{4}}\right)$ is defined if x belongs to (where [.] represents the greatest integer function)

A. $\left[0, \frac{7\pi}{6}\right]$

B. $\left[0, \frac{\pi}{6}\right]$

C. $\left[\frac{11\pi}{6}\right]$

D. $[\pi, 2\pi]$

**Answer: A::B::C**

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**2.** Which of the following functions are defined for all x ?

A. $\sin[x] + \cos[x]([x]\text{denotes the greatest integer} \quad \leq x)$

B. $\sec^{-1}\left(1 + \sin^2 x\right)$

C. $\tan(\log x)$

D. $\sqrt{\frac{9}{8} + \cos x + \cos 2x}$

**Answer: A::B::D**

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**3.** Which of the following functions is/are bounded?

A. $f(x) = \frac{2x}{1 + x^2}, [-2, 2]$

B. $f(x) = \frac{x^2}{1 - x}, x \in [0, 2] - [1]$

C. $f(x) = \frac{x^3 - 8x + 6}{4x + 1}, [0, 5]$

D. none of these

**Answer: A::C**

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**4.** The function 'g' defined by $g(x) = \sin\left(\sin^{-1}\{\sqrt{x}\} + \cos\left(\sin^{-1}\{\sqrt{x}\}\right) - 1\right.$ where {x} denotes the functional part function is

A. an even function

B. a periodic function

C. an odd function

D. neither even nor odd

**Answer: A::B**

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**5.** Let f be a differential function such that $f(x) = f(2-x)$ and $g(x) = f(1+x)$ then (1) g(x) is an odd function (2) g(x) is an even function (3) graph of f(x) is symmetrical about the line x= 1 (4) $f'(1) = 0$

A. g(x) is an odd function

B. g(x) is an even function

C. graph of $f(x)$ is symmetrical about the line x = 1

D. $f'(1) = 0$

**Answer: B::C::D**

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**6.** If a differentiable function satisfies $(x-y)f(x+y) - (x+y)f(x-y) = 2\left(x^2y - y^2\right) \forall x, y \in R$ and $f(1) =$ then:

A. f(x) must be polynomial function

B. f(3) = 12

C. f(0) = 0

D. f(x) may not be differentiable

**Answer: A::B::C**

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**7.** about to only mathematics

A. f(0) = 0

B. f(0) cannot be determined

C. k = 2

D. k cannot be determined

**Answer: A::C**

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**8.** Suppose that $f(x)f(f(x)) = 1$ and $f(1000) = 999$ then which of the following is true

A. $f(500) = \frac{1}{500}$

B. $f(199) = \frac{1}{199}$

C. $f(x) = \frac{1}{x} \forall x \in R - \{0\}$

D. $f(1999) = \frac{1}{1999}$

**Answer: A::B**

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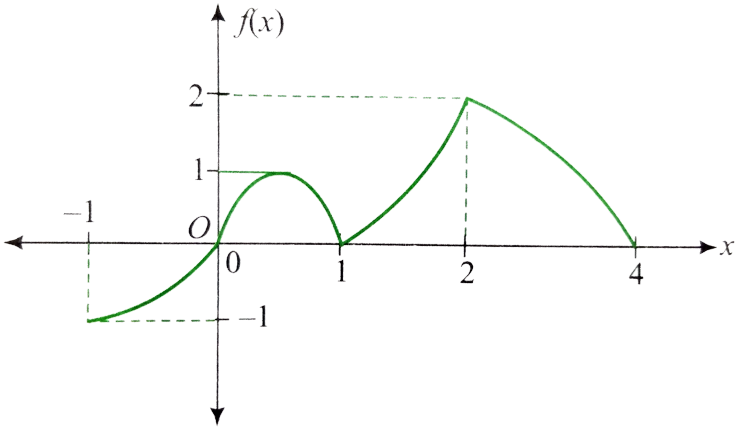
**9.** If graph of a function $f(x)$ which is defined in [-1, 4] is shown in the following figure then identify the correct statement(s).



A. domain of $f(|x|-1)$ is $[-5,5]$

B. range of $f(|x|+1)$ is $[0,2]$

C. range of $f(-|x|)$ is $[-1,0]$

D. domain of $f[-3,3]$

**Answer: A::B::C**

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## Comprehension Type

**1.** Let $f(x)=x^2-2x-1\forall x\in R$. Let $f:(-\infty,a]\to[b,\infty)$, where a is the largest real number for which f(x) is bijective.

If $f:R\to R$, then range of values of k for which equation $f(|x|)=k$ has 4 distinct real roots is

A. $-9/4$

B. $-5/4$

C. $-2$

D. $-1$

**Answer: C**

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**2.** Let $f(x) = x^2 - 2x - 1 \forall x \in R$. Let $f: (-\infty, a] \to [b, \infty)$, where a is the largest real number for which f(x) is bijective.

If $f: R \to R$, then range of values of k for which equation $f(|x|) = k$ has 4 distinct real roots is

A. $1 + \sqrt{x+2}$

B. $1 - \sqrt{x+3}$

C. $1 - \sqrt{x+2}$

D. $1 + \sqrt{x+3}$

**Answer: A**

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**3.** Let $f(x) = x^2 - 2x - 1 \forall \xi n R$ Let $f: (-\infty, a] \to [b, \infty)$, where a is the largest real number for which f(x) is bijective. If $f: R \to R$, $g(x) = f(x) + 3x - 1$, then the least value of function $y = g(|x|)$ is

A. $(-2, -1)$

B. $(-2, 0)$

C. $(-1, 0)$

D. $(0, 1)$

**Answer: A**

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**4.** Consider a differentiable $f: R \to R$ for which $f(1) = 2$ and $f(x + y) = 2^x f(y) + 4^y f(x) \forall x, y \in R.$

The value of f(4) is

A. 160

B. 240

C. 200

D. none of these

**Answer: B**

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**5.** Consider a differentiable $f: R \to R$ for which $f(1) = 2$ and $f(x + y) = 2^x f(y) + 4^y f(x) \, \forall x, y \in R.$

The minimum value of $f(x)$ is

A. $1$

B. $-\frac{1}{2}$

C. $-\frac{1}{4}$

D. none of these

**Answer: C**

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**6.** Let $f(x)$ be real valued and differentiable function on $R$ such that $f(x+y)=\frac{f(x)+f(y)}{1-f(x)f(y)}$ $f(0)$ is equals a. b. c. d. none of these

A. 1

B. 0

C. $-1$

D. none of these

**Answer: B**

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**7.** Let $f(x)$ be real valued and differentiable function on $R$ such that $f(x+y)=\frac{f(x)+f(y)}{1-f(x)f(y)}$ $f(0)$ is equals a. b. c. d. none of these

A. odd function

B. even function

C. odd and even function simultaneously

D. neither even nor odd

**Answer: A**

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