MATHS

BOOKS - CENGAGE

FUNCTIONS

Single Correct Answer Type

1. `f(x)=sin[x]+[s in x],0

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

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

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

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

Answer: C

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2. If

$\varphi(x) = \frac{1}{1+e^{-x}} and S = \varphi(5) + \varphi(4) + \varphi(3) + \ + \varphi(-3) + \varphi(-4) + \varphi$

, then the value of S is. a. 5 b. 11/2 c. 6 d. 13/2

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 if m=0; f(m-1,1) if m!=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 $f: R\overrightarrow{Q}$ (rational numbers), $g: R\overrightarrow{Q}$ (Rational number) 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 a. 1 b. 2 c. 3 d. 4

A. 1

B. 2

C. 3

D. 4

Answer: B

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5. If $fandg$ are two functions defined on N, such that $f(n) - \{2n - 1 \text{ if } niseven2n + 2 \text{ if } nisodd$ 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 ∈ N : m = multiple of 4}

B. { set of even natural numbers}

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

D. {m ∈ 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 Option 1: 4 Option 2: 5 Option 3: 6 Option 4: 7

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 function $y=[x^2]=[x]^2, x \in [0, 2]$ (where [.] denotes the greatest function), is $\{0\}$ b. $\{0, 1\}$ c. $\{1, 2\}$ d. $\{0, 1, 2\}$

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. about to only mathematics

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 $\tan^{-1}\left(\frac{x^2+1}{x^2+\sqrt{3}}\right), x \in R$ 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

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 $[5, \infty)$ b. $\left[-\sqrt{21}, \sqrt{21}\right]$ c. $\left[-5, -\sqrt{21}\right] \cup \left[\sqrt{21}, 5\right] \cup \{0\}$ d. $(-\infty, -5)$

A. $[5, \infty]$

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

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

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

Answer: C

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A. 0

B. 1

C. 2

D. 3

Answer: C

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14. about to only mathematics

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 $f(x) = \left([a]^2 - 5[a] + 4\right)x^3 - \left(6\{a\}^2 - 5\{a\} + 1\right)x - (\tan x)x sgn x$ be an even function for all $x \in R$. Then the sum of all possible values of a is (where $[.] and \{.\}$ denote greatest integer function and fractional part function, respectively). $\frac{17}{6}$ (b) $\frac{53}{6}$ (c) $\frac{31}{3}$ (d) $\frac{35}{3}$

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

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

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

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

Answer: D

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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. π

B. 2π

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. π

C. 2π

D. 3π

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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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. about to only mathematics

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. $l > \frac{1}{3}$

D. $k = 1$

Answer: A

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28. Let $f : [-\infty, 0] \to [1, \infty)$ be defined as $f(x) = (1 + \sqrt{-x}) - (\sqrt{-x} - x)$, then

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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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. Let $f(x): R \to R,\, f(x) = \begin{cases} 2x + \alpha^2 & x \geq 2 \\ \frac{\alpha x}{2} + 10 & x < 2 \end{cases}\Bigg)$ If $f(x)$ is onto function then α belongs to (A) $[1, 4]$ (B) $[-2, 3]$ (C) $[0, 3]$ (D) $[2, 5]$

A. $[1, 4]$

B. $[-2, 3]$

C. $(0, 3]$

D. $[2, 5\}$

Answer: C

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

A. 2

B. 4

C. 6

D. 8

Answer: B

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33. Let $f: R^{+} \rightarrow \{-1, 0, 1\}$ defined by $f(x) = sgn(x - x^{4} + x^{7} - x^{8} - 1)$ where sgn denotes signum function then f(x) is (1) many- one and onto (2) many-one and into (3) one-one and onto (4) one- one and into

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? If $f(x)$ and $g(x)$ are one-one then $f(x) + g(x)$ is also one-one If $f(x)$ and $g(x)$ are one-one then $f(x)g(\dot{x})$ is also one-one 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 ? $(1) f: R \rightarrow R$ defined as $f(x) = e^{sgn x} + e^{x^2}$ $(2) f: [-1, \infty) \rightarrow (0, \infty)$ defined by $f(x) = e^{x^2 + |x|}$ $(3) f: [3, 4] \rightarrow [4, 6]$ defined by $f(x) = |x-1| + |x-2| + |x-3| + x - 4|$

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

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

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

C.

$$f:[3,4]\rightarrow[4,6]\quad\text{defined by}\quad f(x)=|x-1|+|x-2|+|x-3|+|$$

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

Answer: C

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36. If $g(x)=\left(4\cos^4 x-2\cos 2x-\frac{1}{2}\cos 4x-x^7\right)^{\frac{1}{7}}$ then the value of $g(g(100))$ is equal to Option 1: -1 Option 2: 0 Option 3: 1 Option 4: 100

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 let $g(x) = \frac{rx}{1-x}$, Let S be the set off all real numbers r such that $f(g(x)) = g(f(x))$ for infinitely many real number 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 $f(x)=\dfrac{ax+b}{cx+d}$. 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 $f: R \rightarrow R$, $f(x)=x^3+3$,and $g: R \rightarrow R$,$g(x)=2x+1$, then $f^{-1}g^{-1}(23)$ 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 $\{x \in r : f^{-1}(x) = f(x)\}$ 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 $f(x) = \log_a x^2 \;\text{ for }\; x > 0.$ 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 le 1, $2x+1 \;\text{ if }$ 1 lt x le 2 and $g(x) = \{$x^2, -1 le x le 2x+2 $2 \le x \le 3$ 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 $f(x) = ax + bandg(x) = bx + a, whereaandb$ 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 $g^{-1}(x) is$ $2f^{-1}(x)-5$ (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. Let $f\left(x+\frac{1}{y}\right)+f\left(x-\frac{1}{y}\right)=2f(x)f\left(\frac{1}{y}\right)\forall x, y \in R, y \neq 0$ and f(0)=0 then the value of $f(1)+f(2)=$

A. -1

B. 0

C. 1

D. none of these

Answer: B

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49. If $f\left(x^2-6x+6\right)+f\left(x^2-4x+4\right)=2x\,\forall\in x\in R$ 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. If a function $f: R\rightarrow R$ be such that $f(x-f(y))=f(f(y))+xf(y)+f(x)-1\,\forall x, y\in R$ then $f(2)=$

A. 1

B. 3

C. -1

D. none of these

Answer: C

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51. If $f:\overrightarrow{RR}$ is a function satisfying $f(x+y)=f(xy)$ for all $x, y \in Radnf\left(\frac{3}{4}\right)=\frac{3}{4}, thenf\left(\frac{9}{16}\right)=\frac{3}{4}$ 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. $f(x) = x + \frac{1}{2}$

B. $f(x) = \frac{1}{2} + 1$

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

D. $f(x) = x + 1$

Answer: C

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53. Let f be a function defined from $F^+ \to R^+$. 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 test least integral value of k is equal to

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 folllowing functions are defined for all x (A) $\sin[x] + \cos[x\}([x]\}$denotes the greatest integers $\leq x$)(B) $\sec^{-1}(1 + \sin^2 x)$(C)$\tan(\log x)$ (D) $\sqrt{\frac{9}{8} + \cos x + \cos 2x}$

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

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

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

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

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

D. none of these

Answer: A::C

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4. about to only mathematics

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. about to only mathematics

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 function satisfies $(x-y)f(x+y)-(x+y)f(x-y)=2\left(x^2y-y^3\right)\forall x, y \in R \text{ and } f(1) =$

, 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. A function $f(x)$ is defined for all $x \in R$ and satisfies, $f(x+y) = f(x) + 2y^2 + kxy \forall x, y \in R$, where k is a given constant. If $f(1) = 2$ and $f(2) = 8$, find $f(x)$ and show that $f(x+y).\ f\left(\frac{1}{x+y}\right) = k, x+y \neq 0.$

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. Find the derivative of $y = 5\ln(2x^3 - 1)$.

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10. Find the derivative of $y = \log(\cos x^3)$.

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

1. If there are four distinct real numbers satisfying the equation $\left|x^2 - 4x - 7\right| = n$, then number of integers in the range of n is

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2. Let $f: R \to R$ be a polynomial function satisfying $f(f(x) - 2y) = 2x - 3y + f(f(y) - x), \forall x, y \in R$ then the value of $f(20) - f(14)$ is equal to

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3. Let $P(x) = x^4 + ax^3 + bx^2 + cx + d$ be a polynomial such that $P(1) = 1, P(2) = 8, P(3) = 27, P(4) = 64$ then find $P(10)$

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4. A function $f(x)$ is such that $f(x) = 0$ has 8 distinct real roots and $f(4 + x) = f(4 - x)$ for $x \in R$. Sum of real roots of the equation $f(x) = 0$ is

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5. The number of integral values of x satisfying the equation $sgn\left(\left[\frac{15}{1 + x^2}\right]\right) = [1 + 2x]$ is [Note: $sgn(y)$, $[y]$ and y denote signum function, greatest integer function and tional part function respectively.]

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6. Let $f(x)=\frac{1-cx}{1-c^2}$. If $f(x)>0$ for évery x greater than zero. Then the number of integers in the range of c is

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7. Let $g:[-2,2]\to R$, where $g(x)=x^{2015}+sgn(x)+\left[\frac{x^2+1}{p}\right]$ be an odd function for all $x\in[-2,2]$ then the smallest integral value of p is equal to '[Note: $[k]$ denote the greatest integer less than or equal to k.]

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8. If $f(x)=|x+2|+|2x-p|+|x-2|$ attains its minimum value in the interval $(-1,1)$ then sum of all possible integral value of p is

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9. Let the function $f:R\to R$ be defined as $f(x)=\min.(x+2,4-2x,1+4x)$. The maximum vatue of $f(x)$ is equal to

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10. Let $f: R \rightarrow R$ be defined as $f(x) = 2x^3 + 7x - 5$ and $g(x) = f^{-1}(x)$. If $g'(4) = \frac{a}{b}$ where a and b are relatively prime positive integers then $(a + b)$ is equal to

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11. If $f(x) = 3\sqrt{\frac{9}{\log_2(3 - 2x) - 1}}$ then the value of ' a ' which satisfies $f^{-1}(2a - 4) = \frac{1}{2}$, is

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12. Consider the function $f(x) = \sqrt{2 - x} + \sqrt{1 + x}$. If d denotes the number of integers in the domain of f and $'r'$ denotes the number of integers in the range of f, then $(d + r)$ equals

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13. If $f(x, y) = (\max(x, y))^{\min(x, y)}$ and $g(x, y) = \max(x, y) - \min(x, y)$, then $f\left(g\left(-1, \frac{-3}{2}\right), g(-4, -1.75)\right)$ equals

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14. The number of solution of the equation $e^{2x} + e^{x} + e^{-(2x)} + e^{-x} = 3\left(e^{-2x} + e^{x}\right)$ is

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15. 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. $b = 3$

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16. Let $f: R \rightarrow R$ be a continuous function such that $|f(x)-f(y)| \geq |x-y|$ for all $x, y \in R$,then $f(x)$ will be

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17. Let the equation $(a-1)x^2 = x(2b+3)$ be satisfied by three distinct values of x, where $a, b \in R$, If $f(x) = (a-1)x^3 + (2b+3)x^2 + 2x + 1$, and $f(g(x)) = 6x - 7$ where $g(x)$ is a linear function then find the value of $g'(2012)$.

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18. f(x) = (2x^(2) + 3)/(5), for oo lt x le 1

= 6 -5x, for 1 lt x lt 3

= x-3, for 3 le x lt 8, then

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19. Let $f(x) = \frac{x}{1-x}$ and ' a ' be a real number. If $x_0 = a$, $x_1 = f(x_0)$, $x_2 = f(x_1)$, $x_3 = f(x_2)$ and so on. If $x_{2011} = -\left(\frac{1}{2012}\right)$, then the value of reciprocal of ' a ' is

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20. If the largest positive value of the function defined as $f(x) = \sqrt{8x - x^2} - \sqrt{14x - x^2 - 48}$, is $m\sqrt{n}$ where m,$n \in N$, the find least value of $(m+n)$

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21. If range of function $f(x) = \sin^{-1} x + 2\tan^{-1} x + x^2 + 4x + 1$ is $[p, q]$, then the value of $(p+q)$ is______>

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