MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

FUNCTION

Question Bank

1. Let the question $f(x) = \log x^2$ and $\phi(x) = 2\log x$, then

A. a) $f(x) \leq \phi(x)$

B. b) $f(x) \neq \phi(x)$

C. c) $f = \phi$

D. d) $f \neq \phi$

Answer: D

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2. If $f(x) = (p - x^n)^{\frac{1}{n}}, p > 0$ and n is positive integer, then the value of $f[f(x)]$

A. a) -x

B. b) x^2

C. c) x

D. d) x + a

Answer: C

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3. The range of the function $\frac{x}{2 + x^2}$ is

A. $\left[\frac{1}{2\sqrt{2}}, -\frac{1}{2\sqrt{2}}\right]$

B. $\left[-\frac{1}{2\sqrt{2}}, -\frac{1}{2\sqrt{2}}\right]$

C. $\left[-\frac{1}{2\sqrt{2}}, \frac{1}{2\sqrt{2}}\right]$

D. $\left[\frac{1}{2\sqrt{2}}, \frac{1}{2\sqrt{2}}\right]$

Answer: C

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4. The function x and $\frac{x^2}{x}$ are identical for

A. $x \geq 0$

B. $x \leq 0$

C. $x > 0$ or $x < 0$

D. x = 0

Answer: C

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5. The inverse function of $\log_e x$ is

A. a) e^x

B. b) 1/x

C. c) $\frac{1}{\log_e x}$

D. d) $\frac{x}{\log_e x}$

Answer: A

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6. If f(x + y) = f(x) +f(y), then the value of f(0)

A. a) -1

B. b) 0

C. c) 1

D. d) None of these

Answer: B

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7. If the function f(x) satisfies the condition $f\left(x+\frac{1}{x}\right) = x^2+\frac{1}{x^2}, x \neq 0$ then f(x) is

A. a) x^2+2

B. b) x^2-2

C. c) $2-x^2$

D. d) $\frac{x^2}{2}$

Answer: B

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8. The domain of definition of f(x) $=\sin^{-1}\left(\frac{\log_3 x}{3}\right)$ is

A. a) $1 \leq x \leq 9$

B. b) $0 \leq x \leq 9$

C. c) $3 \leq x < 9$

D. d) $1 < x < 9$

Answer: A

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9. The domain of definition of f(x) = $\sqrt{\log_e\left(\frac{4x - x^2}{3}\right)}$ is

A. $0 < x < 3$

B. $x > 1$

C. $1 \leq x \leq 3$

D. $x < 3$

Answer: C

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10. The range of the function f(x) = sin x + cos x is

A. a) $-\sqrt{2} < f(x) < \sqrt{2}$

B. b) $-\sqrt{2} \leq f(x) \leq \sqrt{2}$

C. c) $f(x) \leq \sqrt{2}$

D. d) $0 < f(x) < \sqrt{2}$

Answer: B

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11. If f(x) = $\frac{a^x + a^{-x}}{2}$, $(a > 2)$ then the value of $f(x+y) + f(x-y)$ is equal to

A. a) $2f(x) \cdot f(y)$

B. b) $f(x) \cdot f(y)$

C. c) $\frac{f(x)}{f(y)}$

D. d) f (xy)

Answer: A

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12. If f(x) = $\frac{1}{1-x}$, then f[f{f(x)}] is

A. a) 0

B. b) x

C. c) -x

D. d) $\frac{1}{1+x}$

Answer: B

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13. If f(x) $=x^2$ and g(x) = $\sqrt{x}$, then the correct relation will be

A. $g\{f(4)\} = 4$

B. $g\{f(3)\} = 6$

C. $g\{f(-2)\} = -2$

D. $g\{f(2)\} = 4$

Answer: A

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14. If f(x) = $\frac{e^x - e^{-x}}{e^x + e^{-x}} + 2$, then the inverse function will be

A. $\frac{1}{2}\frac{\log_e(x-2)}{x-1}$

B. $\frac{1}{2}\frac{\log_e(x-1)}{3-x}$

C. $\frac{1}{2}\frac{\log_e x}{2-x}$

D. $-2\log_e\left(\frac{x-1}{1+x}\right)$

Answer: B

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15. If f(x + 2) = $2x^2 + 5x + 7$, then the value of f(1)

A. 0

B. -2

C. 2

D. 4

Answer: D

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16. The range of the function f(x)=$\frac{1}{4 + 2\sin x}$ is

A. (1/6,1/2)

B. [1/6,1/2)

C. [1/6,1/2]

D. (1/6,1/2]

Answer: C

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17. Domain of definition of f(x) $=\sin^{-1}\left(\frac{3-2x}{5}\right)$

A. a) [-1,4]

B. b) (-1,4)

C. c) $[0, \infty]$

D. d) $(-\infty, 4)$

Answer: A

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18. If f(x)=$\frac{Kx}{1+x}, x \neq -1$ and f{f(x)} = x, then the value of k

A. a) $-\sqrt{2}$

B. b) -1

C. c) 1

D. d) $\sqrt{2}$

Answer: B

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19. If f(x) + 2f(1 - x) =$x^2 + 2, \forall x \in R$, then f(x) is

A. a) $x^2 - 2$

B. b) 1

C. c) $\frac{1}{3}(x-2)^2$

D. d) 1/2 (x - 2)

Answer: C

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20. Let f : $(-\infty, 1] \to (-\infty, 1]$ such that f(x) = x(2 -x), then $f^{-1}(x)$ is

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

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

C. $\sqrt{1-x}$

D. $\sqrt{1+x}$

Answer: B

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21. Let f be a function such that f(x + y) = f(x) + f(y) $\forall x, y \in R$, if f(1) = k, then show that f(n) is equal to nk.

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22. f is a function such that f(x + y) = f(x) .f(y), $\forall x, y \in R$, if f(1) = 3, then find $\sum_{r=1}^{n} f(r)$.

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23. Find domain of f(x) = $\sqrt{1-\sqrt{1-\sqrt{1-x^2}}}$.

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24. If f(x) = sin x + cos x , g(x) = $x^2 - 1$ then show that g(f(x)) is invertible in the domain $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$.

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25. If f(x) = $\frac{4^x}{4^x + 2}$, then find f(x) + f(1 - x).

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26. If 2f(x) - 3f(1/x) =$x^2(x \neq 0)$, then find f(2).

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27. If f(x) =$\cos\left[\pi^2\right]x + \cos\left[-\pi^2\right]x$, where [x] stands for the greatest integer function, then find $f\left(\frac{\pi}{2}\right), f\left(\frac{\pi}{4}\right)$.

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28. Find the range of f(x)=$\frac{x^2+x+2}{x^2+x+1}(-\infty < x < \infty)$

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29. Find the domain of definition of the function $f(x) = \frac{1}{\sqrt{|x|+x}}$.

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30. If f : R $\rightarrow$ R such that f(x) = x - [x], where [p] denotes the greatest integar less than or equal to p, then find $f^{-1}(x)$, if exists.

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31. Find the range of the function $f(x) = x^2 + \frac{1}{x^2+1}$.

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32. Find the range of the function ϕ where $\phi(x) = \cos^{-1}\left(\frac{x^2}{1+x^2}\right)$.

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33. Find the range of the function f(x) =$|x-1| + |x-2|, -1 \leq x \leq 3$

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34. Find the range of the function $y = \log_3(5 + 4x - x^2)$.

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35. If f(x + y) = f(x) - f(y), $\forall x, y \in R$, then show that f(3) = f(1)

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36. Find the range of the function f(x) = $\left(e^x - e^{-x}\right)$.

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37. Find the inverse function of the function f(x) = $\left[4 - (x-7)^3\right]^{\frac{1}{5}}$.

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38. If f(x) $=e^{x+a}$, $g(x)=x^{b^2}$ and $h(x)=e^{b^2x}$, then find the value of $\frac{g\{f(x)\}}{h(x)}$

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39. Find domain of the function f(x) = $2^{\sin}$ ^ $(-1)x$+ 1/sqrt(x - 2)`.

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40. Prove that the domain of g(x) $=\frac{\cot^{-1}x}{\sqrt{x^2-[x]}}, x\in R$ is $R-\{\sqrt{n}: n\geq 0, n\in z\}$.

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41. Find the range of the function $y=\frac{1}{2-\cos 2x}$.

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42. Find the range of the function $y = \frac{\log_2\left(\sin x + \cos x + 3\sqrt{2}\right)}{\sqrt{2}}$

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43. Find the value of x which f(x) = $\frac{1}{\sqrt{|x| - x}}$ is not defined.

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44. Find the range of y=$\frac{x}{1 + x^2}$

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45. If f(x) = $\cos(\log_e x)$, then find the value of f(x) $\cdot f(y) - \frac{1}{2}\left[f\left(\frac{x}{y}\right) + f(xy)\right]$

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46. Find the domain of $f(x) = \sin^{-1}\left[\log_9\left(\frac{x^2}{4}\right)\right]$

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47. Without using graph paper the graph of the function $y = f(x) = |x-1| + |x+1|$ for $-2 \leq x \leq 2$ and examine whether the function has any point of discontinuty.

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48. Without using graph paper draw a sketch graph of the function f(x) = $2 + \left|x^2 - 4\right|$.

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49. Find the domain of the function F(x) = $\tan^{-1}\sqrt{x(x+1)} + \sin^{-1}\sqrt{x^2+x+1}$

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50. Find the range of the function f(x) = $\frac{\sec^2 x - \tan x}{\sec^2 x + \tan x}, \left(-\frac{\pi}{2} < x < \frac{\pi}{2}\right).$

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51. Find the domain of function f(x) = $\cos^{-1}\left(\frac{2-|x|}{4}\right) + \frac{1}{\log(3-x)} + \sqrt{x}.$

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52. If 2f(x) + 3f(-x) = 15 - 4x for all real values of x , then show that f(x) = 3 + 4x.

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53. If 2f(x - 1) - $f\left(\frac{1-x}{x}\right) = x$ find f(x).

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54. Find the inverse function of the function f(x) = $\left[4-(x-7)^3\right]^{\frac{1}{5}}$.

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55. If f(n + 1) = $\frac{2f(n)+1}{2}, n = 1, 2, 3, \ldots\ldots$ and f(1) = 2, then find the value of f(101)

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56. f(x) = $\frac{\alpha x}{x+1}(x \neq -1)$, then for what value of α, $f\{f(x)\} = x$?

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57. Find the range of $f(x) = {}^{7-x} P_{x-3}$.

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58. Find the inverse function of the function f(x) = $2^{x(x-1)}$ $(x > 0)$.

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59. If f(x) =log e $\frac{1+x}{1-x}$ and $g(x) = \frac{3x+x^3}{1+3x^2}$, then prove that f[g(x)] = $3 \cdot f(x)$.

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60. If f(x) = $ax^2 + bx + c$ find a, b so that f(x + 1) = f(x) + x + 1 may hold identically.

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61. c is any real number and $c \neq 0$. Prove that $|f(c) - f(-c)| = 2$, where f(x) = $\frac{|x|}{x}$

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62. Find the range of f(x) =$3 \sin \sqrt{\frac{\pi^2}{16} - x^2}$.

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63. 2f(1/x) - f(x) = 5x , find the value of f(x + 1/x).

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64. Find the Domain of definition of the function f(x) = $\sqrt{\log_{10}\left(\frac{3x - x^2}{2}\right) + \sqrt{x - \frac{3}{2}}}$.

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65. If g(x) = $\frac{1}{x^2}$, show that , g(x) - g(x + 1) = $\frac{2x+1}{x^2(x+1)^2}$.

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66. Find the domain of definition of the function f(x) = $\log_{10}\log_{10}\log_{10}\{(x+1)(x-2)\}$.

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67. For which y can be a function of x. $(x \in R, y \in R)$

$(x-h)^2+(y-k)^2=r^2$

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68. For which y can be a function of x. $(x \in R, y \in R)$

$y^2=4ax$

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69. For which y can be a function of x. $(x \in R, y \in R)$

$x^4 = y^2$

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70. For which y can be a function of x. $(x \in R, y \in R)$

$x^6 = y^3$

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71. For which y can be a function of x. $(x \in R, y \in R)$

$3y = (\log x)^2$

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72. If , $f(x) = \log\left(\frac{1+x}{1-x}\right)$,show that $f(x) + f(y) = f\left(\frac{x+y}{1+xy}\right)$

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73. Let $f: \left[-\frac{\pi}{2}, \frac{\pi}{2}\right] \to [-1, 1]$, where f(x)=sinx. Find whether f(x) is one-one or not.

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74. Show $f: R \to R$ defined by f(x)= x^2 + x for all $x \in R$ is many one.

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75. Find number of surjection from A to B where A={1,2,3,4}, B={a,b}

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76. $f(x) = \frac{x^5}{5} - \frac{8}{3}x^3 + (16 + c)x$, then find the range of c, so that function is one-one function.

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77. Find Domain of the following function :

$$f(x) = \sqrt{\log_{0.4}\left(\frac{x-1}{x+5}\right)}$$

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78. Find Domain of the following function :

$$f(x) = \sin^{-1}\left(\log_2\left(\frac{x^2}{2}\right)\right)$$

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79. Find Domain of the following function :

$$f(x) = \log_{x-4}\left(x^2 - 11x + 24\right)$$

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80. Find Domain of the following function :

$f(x) = \sin^{-1}\left[2x^2 - 3\right]$, where [.] devotes G.I.F.

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81. Find the range of the following function

$f(x) = x^2 - 3x + 2$

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82. Find the range of the following function

$f(x) = \sin^2 x - 5\sin x - 6$

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83. Find the range of the following function

$f(x) =$ (x-[x])/(1+x-[x])`

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84. Find the range of the following function

$y = \log_3\left(\log_{1/2}\left(x^2 + 4x + 4\right)\right)$

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85. Find the range of the following function

$f(x) = \log_2\left(\frac{\sin x - \cos x + 3\sqrt{2}}{\sqrt{2}}\right)$

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86. Find the range of the following function

$f(x) = \sin^{-1}\left[x^2 + \frac{1}{2}\right] + \cos^{-1}\left[x^2 - \frac{1}{2}\right]$, [.] denotes the Greatest integer function.

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87. Let $f(x) = \sqrt{x-2}$, g(x)= $\sqrt{5-x}$ find f(x)+g(x), f(x)-g(x), f.g., (f/g)

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88. Find which of the following functions is even or odd ?

$f(x) = x^2 + |\sin x| + \cos x$

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89. Find which of the following functions is even or odd ?

$f(x) = \log\left(x + \sqrt{1+x^2}\right)$

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90. Find which of the following functions is even or odd ?

$f(x) = \log\left(\frac{a+x}{a-x}\right)$

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91. Find which of the following functions is even or odd ?

f(x)=cos(1+cosx)+cos(1+sinx)

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92. If f is an even function defined in the interval (-5,5), find four real values of x satisfying the equation $f(x) = f\left(\frac{x+1}{x+2}\right)$

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93. If f(x+y)+f(x-y)=2f(x).f(y) $\forall x, y \in R.\ f(0) \neq 0$, find if f(x) is even or odd function.

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94. Find whether the given function is even or odd function, where $f(x) = \frac{x(\sin x + \tan x)}{\left[\frac{x+\pi}{\pi} - \frac{1}{2}\right]}$, where, [.] denotes greatest integer function.

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95. If $f:[-20, 20] \to R$ defined by $f(x) = \left[\frac{x^2}{a}\right]\sin x + \cos x$ is an even function. Then evaluate the set of values of 'a'

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96. Find the period of $f(x) = \text{sinx} + \tan\frac{x}{2} + \sin\frac{x}{2^2}\tan\frac{x}{2^3} + \ldots + \sin\frac{x}{2^{n-1}} + \tan\frac{x}{2^n}$

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97. Find the period of the real valued function satisfying f(x)+f(x+4)=f(x+2)+f(x+6)

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98. Let g(x)=1+x-[x] and $f(x) = = \begin{cases} -1 & x < 0 \\ 0 & x = 0 \\ 1 & x > 0 \end{cases}$ Then for all x find f(g(x))

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99. Two functions are defined as under, $f(x) = \begin{cases} x+1 & x \leq 1 \\ 2x+1 & 1 < x \leq 2 \end{cases}$

$g(x) = \begin{cases} x^2 & -1 \leq x < 2 \\ x+2 & 2 \leq x \leq 3 \end{cases}$

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100. If $f: [1, \infty) \to [2, \infty)$ given by f(x)=x+1/x then find $f^{-1}(x)$, (assume bijective).

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101. Let $f:[1/2,\infty)\to[3/4,\infty)$ where f(x)=x^2-x+1. Find the inverse of f(x). Hence or otherwise solve the equation, $x^2-x+1=\frac{1}{2}+\sqrt{x-3/4}$

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102. Let g(x) be the inverse of f(x) and $f'(x)=\frac{1}{1+x^3}$. Then find g'(x) in terms of g(x).

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103. If the function $f:R\to A$ is given by $f(x)=\frac{e^x-e^{-|x|}}{e^x+e^{|x|}}$ is surjective, find A.

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104. Let $f:R\to R$ defined by $f(x)=\frac{x^2}{1+x^2}$. Prove that f is neither injective nor surjective.

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105. Let A=R-{3}, B=R-{1} and $f: A \to B$ defined by $f(x) = \frac{x-2}{x-3}$. Is 'f' bijective ? Give reason.

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106. Let $f: X \to Y$ be a function defined by $f(x) = a\sin\left(x + \frac{\pi}{4}\right) + b\cos x + c$. If f is both one-one and onto, find sets X and Y.

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107. Find the domain of the following :

$f(x) = {}^{16-x}C_{2x-1} + {}^{20-3x}P_{4x-5}$

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108. Find the domain of the following :

$$f(x) = \sin^{-1}\left(\frac{3-2x}{5}\right) + \sqrt{3-x}$$

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109. Find the domain of the following :

$$f(x) = \sqrt{x^2 - |x| - 2}$$

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110. Find the domain of the following :

$$f(x) = \frac{\log_{2x} 3}{\cos^{-1}(2x-1)}$$

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111. Find the range of the following function

f(x)=max{sinx, cosx}

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112. Find the range of the following function

$f(x) = |x-1| + |x-2|, \ -1 \leq x \leq 3$ is

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113. Find the domain and range for $f(x) = \left[\log\left(\sin^{-1}\sqrt{x^2+3x+2}\right)\right]$,

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114. Determine whether even or odd:

$f(x) = x\left(\frac{a^x+1}{a^x-1}\right)$

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115. A function is defined for all real numbers is defined for $x > 0$ as follows:

$$f(x) = \begin{cases} x|x| & 0 \le x < 1 \\ 2x & x \ge 1 \end{cases}$$

How is f defined for $x \le 0$

If f is even

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116. A function is defined for all real numbers is defined for $x > 0$ as follows:

$$f(x) = \begin{cases} x|x| & 0 \le x < 1 \\ 2x & x \ge 1 \end{cases}$$

How is f defined for $x \le 0$

If f is odd

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117. Show that the function $f(x) = \dfrac{2x(\sin x + \tan x)}{2\left[\frac{x+21\pi}{\pi}\right] - 41}$ is symmetric about origin.

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118. Find the period of following function

f(x)=[sin3x]+[cos6x]

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119. Find the period of following function

$$f(x) = \frac{1}{2}\left\{\frac{|\sin x|}{\cos x} + \frac{|\cos x|}{\sin x}\right\}$$

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120. Find the period of following function

$$f(x) = e^{\ln(\sin x)} + \tan^3 x - \operatorname{cosec}(3x - 5)$$

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121. Let f(x+p)=1+{2-3f(x)+3(f(x))^2-(f(x)^3}^(1//3), for all x in R $where$ p>0`, then prove f(x) is periodic.

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122. Let f(x) be defined on [-2,2] and is given by

$f(x) = \begin{cases} -1 & -2 \leq x < 0 \\ x - 1 & 0 \leq x \leq 2 \end{cases}$ and

g(x)=f(|x|)+|f(x)|, then find g(x).

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123. $f(x) = \begin{cases} x - 1 & -1 \leq x < 0 \\ x^2 & 0 < x \leq 1 \end{cases}$ and g(x)=sin x. Then find h(x)=f(|g(x)|)+|f(g(x))|

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124. Find the inverse of the following function:

$f(x) = \sin^{-1}\left(\frac{x}{3}\right), x \in [-3, 3]$

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125. Find the inverse of the following function:

$f(x) = \log_e\left(x^2 + 3x + 1\right), x \in [1, 3]$

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126. Find the inverse of the following function:

$f(x) = \log_e\left(x + \sqrt{x^2 + 1}\right)$

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127. If the function $f: [1, \infty) \to [1, \infty)$ is defined by $f(x) = 2^{x(x-1)}$, then find $f^{-1}(x)$

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128. $f(x) = \sin^{-1}(x - 1) + \cos^{-1}(x - 2)$, then domain of f(x) is

A. [0,2]

B. [1,2]

C. [0,3]

D. [1,3]

Answer: D

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129. The domain of definition of the function y(x) given by the equation $2^x + 2^y = 2$ is

A. $0 < x \leq 1$

B. $0 \leq x < 1$

C. $-\infty < x \leq 0$

D. $-\infty < x < 1$

Answer: D

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130. Domain of the function $f(x) = \frac{1}{\sqrt{\hat{}\ 10C_{x-1} - 3.^{10} C_x}}$ contains the points

A. {9,10,11}

B. {9,10,12}

C. all natural numbers

D. none of these

Answer: D

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131. Domain of the function $f(x) = \frac{x}{\sqrt{\sin(Inx) - \cos(Inx)}}$ is

A. $\left(e^2 n\pi, e^{3n+\frac{1}{2}\pi}\right)$

B. $\left(e^{2n+\frac{1}{4}\pi}, e^{2n-\frac{5}{4}\pi}\right)$

C. $\left(e^{\left(2n+\frac{1}{4}\right)\pi}, e^{\left(2n+\frac{5}{4}\right)\pi}\right)$

D. none of these

Answer: C

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132. If $f(X) = \sqrt{\sec^{-1}\left(\frac{2-|x|}{4}\right)}$, then the domain of f(x) is

A. [-2,2]

B. [-6,6]

C. $(-\infty, -6] \cup [6, \infty)$

D. $[-6, -2] \cup [2, 6]$

Answer: C

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133. The range of the function $f(x) = \sin^{-1}(\log[x]) + \log\left(\sin^{-1}[x]\right)$, (where [,] denotes the greatest integer function) is

A. R

B. [1,2)

C. $\left\{\log\left(\frac{\pi}{2}\right)\right\}$

D. $\{-\sin 1\}$

Answer: C

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134. If $f(X) = \lim \left[\frac{x}{x+1} + \frac{x}{(x+1)(2x+1)} + \frac{x}{(2x+1)(3x+1)} + \ldots + \right.$ $\rightarrow$, then range of f(x) is

A. {0, 1}

B. {-1, 0}

C. {-1, 1}

D. [-1,1]

Answer: A

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135. Find the range of the following function

$$f(x) = \log_2\left(\frac{\sin x - \cos x + 3\sqrt{2}}{\sqrt{2}}\right)$$

A. [1,2]

B. [0,1]

C. (1,2)

D. (0,1)

Answer: A

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136. If $-\frac{\pi}{2} < x < \frac{\pi}{2}$, then the range of the function $f(x) = \cos[x]$ is

A. {1, cos1, cos 2}

B. {cos 1, -cos1, 1}

C. {-1,0,1}

D. {-1,1}

Answer: A

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137. If $f: R \to Risdef \in edbyf(x) = \frac{1}{2 - \cos 3x}$ for each $x \in R$, then the range of f is

A. (1/3, 1)

B. [1/3, 1]

C. (1,2)

D. [1,2]

Answer: B

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138. $If f(x+y) = f(x)f(y) \forall x, y \in R, f(0) \neq 0$ then $F(x) = \left\{ \dfrac{f(x)}{(1+(f(x)))^2} \right.$ is

A. even

B. odd

C. both even or odd

D. neither even nor odd

Answer: A

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139. A function satisfies the conditions $f(x+y) = f(x) + f(y), \forall x, y \in R$ then f is

A. an even function

B. an odd function

C. neither even or odd

D. none of these

Answer: B

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140. If the function $f(x) = [3.5 + b \sin x]$ (where[.] denotes the greatest integer function) is an even function then complete set of values of 'b' is :

A. (-0.5, 0.5)

B. [-0.5, 0.5]

C. (0,1)

D. [-1, 1]

Answer: A

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141. Function $f(x) = \log\left(x^3 + \sqrt{1 + x^6}\right)$ is

A. even function

B. odd function

C. algebraic function

D. discontinuous function

Answer: B

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142. If the function f satisfies the relation $f(x + y) + f(x - y) = 2f(x) \times f(y),\ \forall x, y,\ \in R \text{ and } f(0) \neq 0$, then

A. an even function

B. an odd function

C. neither even or odd

D. none of these

Answer: A

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143. If $\sum_{k=0}^{n} f(x+ka) = 0$ where $a > 0$, then the period of f(x) is

A. a

B. $(n+1)a$

C. $\frac{a}{n} + 1$

D. f(x) is non-periodic

Answer: B

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144. Function f satisfies the equation $f(x+a)=\left\{\frac{1+f(x)}{1-f(x)}\right\}\forall x\in R$ then the period of the function is

A. a

B. 2a

C. 4a

D. 8a

Answer: C

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145. If $f'(x)=\left\{\frac{1-2\sin^2 x}{f(x)}\right\}, f(x)\geq 0, \forall x\in R$ and f(0)=1, then f (x) is a periodic function with the fundamental period

A. π

B. 2π

C. $\frac{\pi}{2}$

D. none of these

Answer: A

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146. If a, b be two fixed positive integers such that $f(a+x) = b + \left[b^3 + 1 - 3b^2 f(x) + 3bf(x)^2 - (f(x))^3\right]^{\frac{1}{3}}$ for all real x, then f(x) is a periodic function with period.

A. a

B. 2a

C. b

D. 2b

Answer: B

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147. Period of $f(x) = \sin, \frac{\pi}{2}x + 2\cos, \frac{\pi}{3}x - \tan, \frac{\pi}{4}x$ is equal to

A. 4

B. 8

C. 12

D. 16

Answer: C

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148. Polynomial function f(x) satisfying the condition $f(x), f\left(\frac{1}{x}\right) = f(x) + f\left(\frac{1}{x}\right)$. If f(10)=1001, then f(20) is

A. 7001

B. 8001

C. 8000

D. none of these

Answer: B

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149. The function f(x) is defined for all real x. If $f(a+b)=f(ab)\,\forall a$ and b and $f\left(-\frac{1}{2}\right)=-\frac{1}{2}$, then f(2009) equals

A. -2009

B. 2009

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

D. $-\frac{2000}{2}$

Answer: C

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150. If

$''(x) = -f(x)$ and $g(x) = -f'(x)$ and $F(x) = \left(f\left(\frac{x}{2}\right)\right)^2 + \left(g\left(\frac{x}{2}\right)\right)$

and given that f(5)=5, then f(10) is equal to

A. 5

B. 10

C. 0

D. 15

Answer: A

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151. If $fog = |\sin x|$ and $gof = \sin^2\sqrt{x}$ then f(x) and f(x) are

A. $f(x) = \sqrt{\sin x}, g(x) = x^2$

B. $f(x) = |x|, g(x) = \sin x$

C. $f(x) = \sqrt{x}, g(x) = \sin^2 x$

D. $f(x) = \sin\sqrt{x}, g(x) = x^2$

Answer: C

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152. If f is a function such that f(0)=2, f(1)=3 and $f(x+2) = 2f(x) - f(x+1)$ for every real x then f (5) is

A. 7

B. 13

C. 1

D. 5

Answer: B

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153. Let $f(x) = \begin{cases} -1 + \sin K_1 \pi x & x is rational \\ 1 + \cos K_2 \pi x & x is irrational \end{cases}$ If f(x) is periodic function, then:

A. either $K_1, K_2 \in rational$ or $K_1, K_2 \in irrational$

B. $K_1, K_2 \in$ rational only

C. K_1 and $K_2 \in$ irrational only

D. K_1 and $K_2 \in$ irrational such $\frac{K_1}{K_2}$ is rational.

Answer: B

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154. Let $f(1) = 1$ and $f(n) = 2\sum_{r=1}^{n-1} f(r)$. Then $\sum_{n=1}^{m} f(n)$ is equal to

A. $3^{m-1} - 1$

B. $3^m - 1$

C. $3^m - 1$

D. none of these

Answer: B

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155. Given $f(x) = In\left\{\frac{1+x}{1-x}\right\}$ and $g(x) = \left\{\frac{3x+x^3}{1+3x^2}\right\}$. Then f(g(x)is equal to

A. $-f(x)$

B. $3f(x)$

C. $[f(x)]^2$

D. none of these

Answer: B

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156. If $f:[2,3) \to [0,1)$ is defined by $f(x) = x - [x]$, the fractional part of x, then $f^{-1}(x)$

A. equals x+2

B. equals x-2

C. does not exist

D. none of these

Answer: A

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157. The domain of $y = \cos^{-1}\left(\frac{1-2|x|}{3}\right) + \log_{|x-1|} x$ is

A. (0,2)

B. $(0,1) \cup (1,2)$

C. (1,3)

D. (3,5)

Answer: B

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158. Let $f:\left[-\frac{\pi}{3}, 2\frac{\pi}{3}\right] \to [0,4]$ be a function defined as $f(x) = \sqrt{3}\sin x - \cos x + 2$. Then $f^{-1}(x)$ is given by

A. $\sin^{-1}\left(\frac{x-2}{2}\right) - \frac{\pi}{6}$

B. $\sin^{-1}\left(\frac{x+2}{2}\right) + \frac{\pi}{6}$

C. $2\frac{\pi}{3} - \cos^{-1}\left(\frac{x-2}{2}\right)$

D. none of these

Answer: C

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159. Let n be a positive integer with $f(n) = 1! + 2! + 3! + \ldots. + n!$ and P(x) and Q(x) be polynomials in x such that $f(n+2) = Q(n)f(n) + P(n)f(n+1)$. Find P(2).

A. P(x)=x+3

B. Q(x)=-1+2

C. P(X)=-1-2

D. Q(x)=x+3

Answer: A

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160. A function $f: R \to R$ is defined by $f(x+y) - kxy = f(x) + 2y^2, \forall xy \in R$ and $f(1) = 2, f(2) = 8,$ where k is some constant, then $f(x+y).\, f\left(\frac{1}{x+y}\right)$ is equal to $(where x + y \neq y)$

A. 1

B. 4

C. f(1)

D. none of these

Answer: B

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161. If $f(x) = 1 + x^2$ and $[g(x)] = 1 + x^2 - 2x^3 + x^4$, $g(2) = 2$, then

A. g(x) is one -one

B. g(2)=2

C. g(x)=x

D. none of these

Answer: B

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162. π is the FUNDAMENTAL period of

A. $\dfrac{1+\sin x}{\cos x(1+\cos ecx)}$

B. $|\sin x|+|\cos x|$

C. $\cos(\sin x)+\cos(\cos x)$

D. none of these

Answer: A

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163. If the range of the function $y=\dfrac{x-1}{a-x^2+1}$ does not contain any values belonging to the interval $\left[-1,-\dfrac{1}{3}\right]$ then the integral value(s) of a can be

A. 5

B. 1

C. -5

D. none of these

Answer: C

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164. Let $f: d \to R$ be defined by $f(X) = In(In(In(Inx)))$ then

A. f(X) is into

B. f(x) is many one

C. $D = (e^e, \infty)$

D. none of these

Answer: C

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165. Let

$f(x) = \max\{1 + \sin x, 1, 1 - \cos x\}, \xi n[0, 2\pi]$ and $g(x) = \max\{1, |x -$

, then

A. g(f(0))=10

B. f(g(0))=1+sin 1

C. f(g(1))=1

D. none of these

Answer: B

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166. Let $f(x) = \frac{e^{-x}}{1 + [x]}$, then

A. Domain of definition of f(X) is R-[-1,0)

B. Range od definition of f(x) is (-1/e, 1]

C. f(x) is one-one in its domain

D. none of these

Answer: A

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167. The value(s) of a, for which $\frac{x^3-6x^2+11x-6}{x^3+x^2-10x+8}+\frac{a}{30}=0$ does not have real solution is/are

A. -10

B. -12

C. 5

D. none of these

Answer: C

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168. f(x) is real valued function, satisfying $f(x+y)+f(x-y)=2f(X), f(y)f\ \text{or}\ ally \neq R$, then

A. f(x) is an even function

B. f(x) is even if f(0) =1

C. f(x) is odd if f(0)=0

D. f(x) is even if f(0)=0

Answer: B::C

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169. If S is the set of all real numbers x for which $\frac{2x-1}{2x^3+3x^2+x} > 0$, and P is the subset of S, then then P can be

A. $\left(\frac{3}{2}, 2\right)$

B. $\left(-\frac{1}{2}, 0\right)$

C. $\left(\frac{1}{2}, 3\right)$

D. $(0, \infty)$

Answer: A::B::C

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170. If $f'(x) = \frac{1 - 2\sin^2 x}{f(x)}$, $(f(x) \geq 0,\ \forall x \in R$ and f(0)=1) then f(x) is a periodic function with the period

A. π

B. 2π

C. $\frac{\pi}{2}$

D. none of these

Answer:

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171. If

$f(x) = \sin^2 x + \sin^2\left(x + \frac{\pi}{3}\right) + \cos x . \cos\left(x + \frac{\pi}{3}\right)$ and $g\left(\frac{5}{4}\right) = 1$,

then

A. $f\left(\frac{\pi}{12}\right) = \frac{5}{4}$

B. $gof\left(\frac{\pi}{10}\right) = 1$

C. gof is a constant function

D. fog is a constant function

Answer: A::B::C::D

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172. Let $f: \left[-\frac{\pi}{3}, 2\frac{\pi}{3}\right] \to [0, 4]$ be a function defined as $f(x) = \sqrt{3}\sin x - \cos x + 2$. Then $f^{-1}(x)$ is given by

A. $\sin^{-1}\left(x - \frac{2}{2}\right) - \frac{\pi}{6}$

B. $\sin^{-1}\left(\frac{x-2}{2}\right) + \frac{\pi}{6}$

C. $2\frac{\pi}{3} - \cos^{-1}\left(\frac{x-2}{2}\right)$

D. none of these

Answer: B::C

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173. If $f(x) = \frac{x}{x^2+1}$ and $f(A) = \left\{y: -\frac{1}{2} \leq y < 0\right\}$, then set A is

A. $[-1, 0)$

B. $(-\infty, -1]$

C. $(-\infty, 0)$

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

Answer: A::B::C

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174. If $f(x) = \cos\left(\left[\pi^2 \mid x\right)\right. + \cos\left(\left[-\pi^2 \mid x\right)\right.$, where [x] stands for the greatest integer function, then

A. $f\left(\frac{\pi}{2}\right) = -1$

B. $f(\pi) = 1$

C. $f(-\pi) = 0$

D. $f\left(\frac{\pi}{4}\right) = 1$

Answer: A::C

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175. Domain of $f(x) = \sin^{-1}\left[2 - 4x^2\right]$ is ([.] denotes the greatest integer function)

A. $\left[-\frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{2}\right] \sim \{0\}$

B. $\left[-\frac{\sqrt{3}}{2}, 0\right)$

C. $\left[-\frac{\sqrt{3}}{2}, 0\right) \cup \left(0, \frac{\sqrt{3}}{2}\right]$

D. $\left[-\frac{\sqrt{3}}{2}, 8\right]$

Answer: A::C

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176. $f(x) = \cos^2 x + \cos^2\left(\frac{\pi}{3} + x\right) - \cos x \cos\left(\frac{\pi}{3} + x\right)$ is

A. an odd function

B. an even function

C. a periodic function

D. f(0)=f(1)

Answer: B::C::D

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177. If [x] denotes the greatest integer less than or equal to x, the extreme values of the function

$f(x) = [1 + \sin x] + [1 + \sin 2x] + [1 + \sin 3x] + \ldots + [1 + \sin nx], n \in 1$

are

A. n-1

B. n

C. n+1

D. n+2

Answer: B::C

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178. Let y=f(x) is a parabola whose vertex is at $\left(\frac{3}{4}, -\frac{1}{4}\right)$,the length of latus rectum is 1 and axis is parallel to positive direction of y-axis

Let $g(x) = f(|x|)$,h(x)=|g(x)|

Answer the following questions are based on above passage:

If g(x)+a=0 has exactly two roots,then a belongs to

A. 2

B. 3

C. 4

D. 6

Answer: C

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179. Let y=f(x) is a parabola whose vertex is at $\left(\frac{3}{4}, -\frac{1}{4}\right)$,the length of latus rectum is 1 and axis is parallel to positive direction of y-axis

Let $g(x) = f(|x|)$,h(x)=|g(x)|

Answer the following questions are based on above passage:

If g(x)+a=0 has exactly two roots,then a belongs to

A. $(0, 2)$

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

C. $(2, \infty)$

D. (-1,2)

Answer: B

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180. Let y=f(x) is a parabola whose vertex is at $\left(\frac{3}{4}, -\frac{1}{4}\right)$,the length of latus rectum is 1 and axis is parallel to positive direction of y-axis

Let $g(x) = f(|x|)$,h(x)=|g(x)|

Answer the following questions are based on above passage:

The number of solution of h'(x)=0 is

A. one

B. two

C. three

D. four

Answer: B

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181. Let $x \in R$ be any real number such that xlies between any two consecutive integers say n-1 and n, i.e.,$n-1 < x \leq n$ then we can always find this unique integer n.

Let us call this n as super integral value of x.

We denote it symbolically as (x)

For example: if x=2.63,then (x)=3,if x=-2.63,then (x)=-2

Answer the following questions are based on above passage:The range of the function y=$y = \frac{(x)}{x}$ if $x \in (-\infty, 0)$,is

A. $(-\infty, 0]$

B. [-1,0]

C. [0,1]

D. [-1,1]

Answer: C

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182. Let $x \in R$ be any real number such that xlies between any two consecutive integers say n-1 and n, i.e.,$n-1 < x \leq n$ then we can always find this unique integer n.

Let us call this n as super integral value of x.

We denote it symbolically as (x)

For example: if x=2.63,then (x)=3,if x=-2.63,then (x)=-2

Answer the following questions are based on above passage:The range of the function y=$y = \frac{(x)}{x}$ if $x \in (-\infty, 0)$,is

A. 0

B. 1

C. 2

D. -1

Answer: B

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183. If $f(x) = \cos[\pi^2]x + \cos[-\pi^2]x$ then the value of $f\left(\frac{\pi}{4}\right) + f\left(\frac{\pi}{2}\right)$ is

A. $\frac{1}{\sqrt{2}}$

B. $1 + \frac{1}{\sqrt{2}}$

C. $1 - \frac{1}{\sqrt{2}}$

D. $-1 + \frac{1}{\sqrt{2}}$

Answer: D

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184. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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185. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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186. The number of solutions of 2{x} - 1 = nx where $n \in (2, \infty)$ and {.} represents fraction part of x is

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187. Let f(x) and g(x) be one-one onto functions where $f: \{a, b, c, d\} \to \{1, 2, 3, 4\}$ and $g: \{3, 4, 5, 6\} \to \{w, x, y, z\}$ respectively. The number of elements in the range set of g (f(x)) are

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188. A polynomial f(x0 satisfies the condition $f(x).\, f\left(\frac{1}{x}\right) = f(x) + f\left(\frac{1}{x}\right)$ and f(10) = 1001, then the value of f(2) =?

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189. The number of solutions of $\sin\left(\frac{x}{2}\right) + 2\pi x = x^2 + \pi^2 + 1$ must be

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190. Let f be a function from the set of positive integers to the set of real number i.e $f: N \to R$, such that `f(1) = 1 and r=1 to n ∑ rf(r)=n(n+1)f(n),∀n≥2'

then the value of 2126f(1063)

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191. Let f be a function from the set of positive integers to the set of real number i.e $f: N \to R$, such that $f(1) + 2f\{2\} + 3f\{3\} + \ldots . + nf\{n\} = n(n+1)f(n)$ for $n \geq 2$

Then the of $\frac{1}{f(4)}$ must be

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192. A function $f: R \to R$ is defined as $f(x) = \frac{\alpha x^2 + 6x - 8}{\alpha + 6x - 8x^2}$. Find the set of values of α for which is onto.

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193. Find the domain of the following function :

$$f(x) = \sqrt{\sin^{-1}(\log_2 x)} + \sqrt{\cos(\sin x)} + \sin^{1-}\left(\frac{1+x^2}{2x}\right)$$

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194. Range of $f(x) = \dfrac{\sin^2 x + \sin x - 1}{\sin^2 x - \sin x + 2}$

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195. If p and q are positive integers, f is a function defined for positive number and attain only positive value such that $f(xf(y)) = x^p y^q$, prove that $q = p^2$

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196. Check whether the function defined $f(x+\lambda)=1+\sqrt{2f(x)-f^2(x)}\,\forall x\in R$ is a periodic or not.

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197. Let f(x, y) be a periodic function satisfying the condition f(x, y) = f(2x + 2y), (2y - 2x) $\forall x, y \in R$. Now define a function g by $g(x)=f(2^x,0)$. Then prove that g(x) is periodic function, find its period.

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198. If $f(x)=2x+|x|, g(x)=\frac{1}{3}(2x-|x|)$ and h(x) = f(g(x)), then find the domain of $\frac{\sin^{1-}(h(h(h(h...h(x)...))))}{n\text{times}}$

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199. Find the domain and range of h(x) = g(f(x), where

$$f(x) = \begin{cases} [x] & -2 \leq x \leq -1 \\ |x| + 1 & -1 < x \leq 2 \end{cases} \text{ and } g(x) = \begin{cases} [x] & -\pi \leq x \leq 0 \\ \sin x & 0 < x \leq \pi \end{cases}$$

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200. Determine all functions $f: R \to R$ satisfying

$$f(x - f(y)) = f(f(y)) + xf(y) + f(x) - 1 \forall x, y \in R$$

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201. Let $R \to f(x) = x^3 + ax^2 + bx + c\sin x, a, b, c \in R$ Find the condition that should be imposed on a, b, c so that the given function becomes invertible ?

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202. If f(x) satisfies the relation $f(x+y)=f(x)+f(y)\,\forall x, y \in R$ and f(1) = 5, Find $\sum_{x=1}^{m} f(x)$Also prove that f(x) is an odd function.

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203. In the function f(x) is defined for $x \in [0, 1]$ then the function f(2x+3) is defined for

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

B. [-3/2,-1]

C. [-2/3,1]

D. $x > 0$

Answer: B

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204. The domain of the function $f(x) = \frac{\sin^{-1}(x-3)}{\sqrt{9-x^2}}$ is

A. [1,2]

B. [2,3)

C. [2,3]

D. (1,2)

Answer: B

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205. The domain of the real valued function $f(x) = 3e^{\sqrt{x^2-1}}\log(x-1)$ is

A. R-{1}

B. R-[-1,1]

C. $[1, \infty)$

D. $(1, \infty)$

Answer: D

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206. Domain of the function $f(x) = \sin^{-1}\left(\frac{2-|x|}{4}\right) + \cos^{-1}\left(\frac{2-|x|}{4}\right) + \tan^{-1}\left(\frac{2-|x|}{4}\right)$ is

A. R-{1}

B. [0, 6]

C. [-6, 6]

D. [-3, 3]

Answer: C

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207. The domain of the function $f(x) = \sin^{-1}\frac{1}{|x^2-1|} + \frac{1}{\sqrt{\sin^2 x + \sin x + 1}}$ is :

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

B. $(-\infty, -\sqrt{2}] \cup [\sqrt{2}, -\infty)$

C. $(-\infty, -\sqrt{2}] \cup [\sqrt{2}, \infty) \cup \{0\}$

D. None of these

Answer: C

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208. The range of function $f(x) = \sqrt{{}^{x^2+4x}C_{2x^2+3}}$

A. $\{1, 2\sqrt{3}\}$

B. $\{1, 2\sqrt{3}, 3\sqrt{5}\}$

C. {1, 2, 3}

D. {1, 2}

Answer: A

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209. Let n be a natural number. Then the range of the function $f(n) = {}^{8-n}P_{n-4}, 4 \leq n \leq 6$, is

A. {1, 2, 3, 4}

B. {1, 2, 3, 4, 5, 6}

C. {1, 2, 3}

D. {1, 2, 3, 4, 5}

Answer: C

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210. If $x^2 + y^2 + z^2 = 1$, then xy + yz + zx lies in

A. [-1/2,1]

B. [1/2,1]

C. [-1/2,-1]

D. [1/2,-1]

Answer: A

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211. The range of the function

$$f(x) = \sin^{-1}\left[x^2 + \frac{1}{2}\right] + \cos^{-1}\left[x^2 - \frac{1}{2}\right],$$

where [.] is the greatest integer function, is

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

B. $\left\{0, \frac{\pi}{2}\right\}$

C. $\{\pi\}$

D. $\left(0, \frac{\pi}{2}\right)$

Answer: C

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212. The range of the function $f(x) = \sqrt{3x^2 - 4x + 5}$ is

A. $\left[-\infty, \sqrt{\frac{11}{3}}\right]$

B. $\left(-\infty, \sqrt{\frac{11}{3}}\right)$

C. $\left[\sqrt{\frac{11}{3}}, \infty\right)$

D. $\left(\sqrt{\frac{11}{3}}, \infty\right)$

Answer: C

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213. If the graph of the function $f(x) = \frac{a^x - 1}{x^n(a^x + 1)}$ is symmetric about y-axis, then n equals

A. 2

B. 1/2

C. 1/4

D. -1/3

Answer: D

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214. If the graph of the function f(x) is symmetrical about x = 20 then

A. f(x+20)=f(20-x)

B. f(x)=f(-x)

C. f(x+20)=f(x-20)

D. None of these

Answer: A

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215. If f is even function defined on the interval (-5, 5), then real values of x satisfying the equation $f(x) = f\left(\frac{x+1}{x+2}\right)$ are

A. `(3-sqrt5)/2 ,(3+sqrt5)/2 '

B. `(-5-sqrt3)/2 ,(-3+sqrt5)/2 ,

C. (-3-sqrt5)/2 , (5+sqrt3)/2`

D. 3-sqrt5 , 3+sqrt5`

Answer: A

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216. Which of the following function is even function

A. $f(x) = \frac{a^x + 1}{a^x - 1}$

B. $f(x) = x\left(\frac{a^x - 1}{a^x + 1}\right)$

C. $f(x) = \frac{a^x - a^{-x}}{a^x + a^{-x}}$

D. f(x) = sin x

Answer: B

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217. If f(x) and g(x) be two given function with all real numbers as their domain, then $h(x) = \{f(x) + f(-x)\}\{g(x) - g(-x)\}$ is

A. an even function

B. an odd function

C. even as well as odd function

D. None of these

Answer: B

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218. Period of f(x)=[x]+[x+1/3]+[x+2/3]-3x+10, where [.] denotes the greatest integer function.

A. 1

B. 0.66666666666667

C. 0.33333333333333

D. 0.5

Answer: C

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219. The function $f(x) = \frac{1}{2}\left\{\frac{|\sin x|}{\cos x} + \frac{\sin x}{|\cos x|}\right\}$ is periodic with period

A. π

B. $\frac{\pi}{2}$

C. 2π

D. 3π

Answer: C

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220. The value of $n \in 1$, for which the function $f(x) = \frac{\sin nx}{\sin \frac{x}{n}}$ has 4π as its period is equal to

A. 2

B. 3

C. 5

D. 4

Answer: A

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221. If f(x) = is an odd periodic function with period 2, then f(4) equals

A. 0

B. 2

C. 4

D. -4

Answer: A

Watch Video Solution

222. Period of $f(x) = \cos 2\pi\{x\}$ is , where {x} denote the fractional part of x)

A. 1

B. $\frac{\pi}{2}$

C. 0.5

D. π

Answer:

Watch Video Solution

223. The period of $\sin\left(\frac{\pi\{x\}}{12}\right)+\cos\left(\frac{\pi x}{8}\right)+\tan\left(\frac{\pi\{x\}}{3}\right)$

A. 12

B. 4

C. 3

D. 144

Answer: D

Watch Video Solution

224. Let f : $(4,6) \to (6,8)beafunctiondef \in edbyf(x)x + \left[\frac{x}{2}\right]\left(where[.]de\neg estheg$

f^(-1)(x)` is equal to

A. x-[x/2]

B. -x-2

C. x-2

D. $\frac{1}{x + \left[\frac{\pi}{2}\right]}$

Answer: C

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225. The value of b and c for which the identity f(x+1)-f(x)=8x+3 is satisfied, where $f(x) = bx^2 + cx + d$, are

A. 4, 1

B. 4, -1

C. -1, 4

D. None of these

Answer: B

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226. If $f(x) = \sin\sqrt{[a]}x$, (where [.] denotes the greatest integer function), has π as it's fundamental period, then

A. a = 1

B. $a \in [1, 2)$

C. $a \in [2, 3)$

D. $a \in [4, 9)$

Answer: D

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227. If $f: R \to [-1, 1]$, where $f(x) = \sin\left(\frac{\pi}{2}[x]\right)$ (where [.] denotes the greatest integer function), then the range of f(x) is

A. [-1, 1]

B. {-1, 1}

C. {-1, 0, 1}

D. None of these

Answer: C

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228. If $[x]^2 - 5[x] + 6 = 0$ (where [.] denotes the greatest integer function), then x belongs to

A. [2,4)

B. [2,4)-{3}

C. {3}

D. {2}

Answer: A

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229. Let $f:(-\infty, 1] \to (-\infty, 1]$ such that f(x)=x(2-x). Then $f^{-1}(x)$

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

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

C. $\sqrt{1-x}$

D. None of these

Answer: B

Watch Video Solution

230. Let $f: R \to R$ be a function such that $f(x) = x^3 + x^2 + 3x + \sin x$. Then

A. f is one-one and into

B. f is one-one and onto

C. f is many-one and into

D. f is many-one and onto

Answer: B

Watch Video Solution

231. Let $f: \left[-\frac{\pi}{3}, \frac{2\pi}{3}\right] \to [0, 4]$ be a function defined as $f(x) = \sqrt{3}\sin x - \cos x + 2$. Then $f^{-1}(x)$ is given by

A. $\sin^{-1}\left(\frac{x-2}{2}\right) - \frac{\pi}{6}$

B. $\sin^{-1}\left(\frac{x-2}{2}\right) + \frac{\pi}{6}$

C. $\frac{2\pi}{3} + \cos^{-1}\left(\frac{x-2}{2}\right)$

D. None of these

Answer: B

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232. Let $f(x) = (ax+b) \cos x + (cx+ d) \sin x$ and $f'(x) = x \cos x$ be an identity in x then

A. $a = 5, b = 2$

B. $a = 5, b = 1$

C. $a = 5, b = -5$

D. $b = 1, c = 1$

Answer: D

Watch Video Solution

233. If $f(x) = \cos|x| + \left[\left|\frac{\sin x}{2}\right|\right]$ (where [.] denotes the greatest integer function), then f (x) is

A. even

B. odd

C. odd as well as even

D. None of these

Answer: A

Watch Video Solution

234. The number of points (x, y), where the curves |y| = In|x| and $(x-1)^2 + y^2 - 4 = 0$ cut each other, is

A. 2

B. 3

C. 1

D. 6

Answer: B

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235. Let $f(x) = \left[\frac{1}{2} + \frac{n}{100}\right]$, where [.] denotes the greatest integer function, then the value of $\sum_{n-1}^{151} f(n)$ is

A. 101

B. 102

C. 100

D. 103

Answer: B

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236. If $y = \sqrt{e^{\sin^{-1}(\log_2 x^2)}}$, then y is real if

A. $x \in R - \{0\}$

B. $x \in \left[-\sqrt{2}, \sqrt{2}\right]$

C. $x \in \left(-\infty, -\frac{1}{\sqrt{2}}\right] \cup \left[\frac{1}{\sqrt{2}}, \infty\right]$

D. $x \in \left[-\sqrt{2}, -\frac{1}{\sqrt{2}}\right] \cup \left[\frac{1}{\sqrt{2}}, \sqrt{2}\right]$

Answer: D

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237. If $[2\sin x] + [\cos x] = -3$ then the range of the function $f(x) = \sin x + \sqrt{3}\cos x$ in $[0, 2\pi]$ is, (where [.] denotes the greatest integer function)

A. (0.2π)

B. (-2,-1)

C. (-1.-1/2)

D. None of these

Answer: B

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238. If $F(x+1) = \frac{2F(x)+1}{2}$, n = 1,2,3.....and F(1) = 2 then F(101)

A. 52

B. 49

C. 48

D. 51

Answer: A

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239. If $f: R \to R$ satisfies $f(x+y) = f(x) + f(y) f \text{ or } allx, y \in R$ and f(1)=7 , then $\sum_{r=1}^{n} f(r)$

A. $\frac{7n(n+1)}{2}$

B. $\frac{7n}{2}$

C. $\frac{7(n+1)}{2}$

D. $7n(n+1)$

Answer: A

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240. If f(x+y,x-y)=xy then the arithmetic mean of f(y, x) & f(x,y)

A. 0

B. x

C. y

D. $\frac{x+y}{2}$

Answer: A

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241. $f(x)=\sqrt{[\sin 2x]-[\cos 2x]}$:[.]GIF, then range of f(x)

A. {0}

B. {1}

C. {0, 1}

D. $\{0, 1, \sqrt{2}\}$

Answer: A

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242. If `f(x) = {(x^2, "for", x ge 0), (x, "for", x lt 0):} then fof(x) is given by

A. $x^2 \text{for} x \geq 0, x \text{for} x < 0$

B. $x^4 \text{for} x \geq 0, x^2 \text{for} x < 0$

C. $x^4 \text{for} x \geq 0, \text{for} x < 0$

D. $x^4 \text{for} x \geq 0, x \text{for} x < 0$

Answer: D

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243. Domain of f(x) is [-1, 2] then domain of $f\left([x] - x^2 + 4\right)$ where [.] denotes the greatest integer function, is

A. $[-1, \sqrt{7}]$

B. $[-\sqrt{3}, -1] \cup [\sqrt{3}, \sqrt{7}]$

C. $(-1, \sqrt{7}]$

D. $[-\sqrt{3}, -1) \cup [\sqrt{3}, \sqrt{7})$

Answer: B

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244. Number of solution of the equation $x^2 - 2 - 2[x] = 0([.])$ denotes the greatest integer function is

A. one

B. two

C. zero

D. infinity

Answer: A

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245. Let $S_n = \sum_{t=1}^{n} r!(n > 6)$, then $S_n - 7\left[\frac{S_n}{7}\right]$ (where [.] denotes the greatest integer function) is equal to

A. $\left[\frac{n}{7}\right]$

B. $n! - 7\left[\frac{n!}{7}\right]$

C. 5

D. 3

Answer: C

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246. Range of

$$f(x) = [1 + \sin x] + \left[2 + \sin\frac{x}{2}\right] + \left[3 + \sin\frac{x}{3}\right] + \ldots . + \left[n + \sin\frac{x}{n}\right]$$

AA x in [0, pi]` (where [.] denotes the greatest integer function).

A. $\left\{\frac{n^2+n-2}{2}, \frac{n(n+1)}{2}\right\}$

B. $\left\{\frac{n(n+1)}{2}\right\}$

C. $\left\{\frac{n^2+n-2}{2}, \frac{n(n+1)}{2}, \frac{n^2+n+2}{2}\right\}$

D. $\frac{n(n+1)}{2}, \frac{n^2+n+2}{2}\Big\}$

Answer: D

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247. The number of solutions of $\log_{\sin x} 2^{\tan x} > 0$ in the interval $\left(0, \frac{\pi}{2}\right)$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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248. If $f(x) = \ln\left(\frac{x^2 + e}{x^2 + 1}\right)$, then range of f(x) is

A. (0, 1)

B. [0, 1}

C. [0, 1)

D. (0, 1]

Answer: D

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249. If f(x) = {x} + sin ax (where {.} denotes the fractional part function) is periodic then

A. a' is a rational multiple of π

B. a' is a natural number

C. a' is any real number

D. a' is any positive real number

Answer: A

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250. The value of a for which the range of the function $f(x) = \frac{x-1}{1-x^2-a}$ does not contain the interval [-1, 1]

A. 1

B. 0

C. -1

D. None of these

Answer: D

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251. If the graph of the function f(x) is symmetrical about two lines x = a and x = b then f(x) must be period

A. $\frac{b-a}{2}$

B. b - a

C. 2(b - a)

D. None of these

Answer: C

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252. If $f(x) = 27x^3 + \frac{1}{x^3}$ and α, β are the roots of $3x + \frac{1}{x} = 2$ then

A. $f(\alpha) = f(\beta)$

B. $f(\alpha) = 10$

C. $f(\beta) = 12$

D. None of these

Answer: A

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253. If $A = \left\{x : \frac{\pi}{6} \leq x \leq \frac{\pi}{3}\right\}$ and $f(x) = \cos x - x(1+x)$ then f(A) is equal to-

A. [pi/6, pi/3]`

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

C. $\left[\frac{1}{2} - \frac{\pi}{3}\left(1+\frac{\pi}{3}\right), \frac{\sqrt{3}}{2} - \frac{\pi}{6}\left(1+\frac{\pi}{6}\right)\right]$

D. $\left[\frac{1}{2} + \frac{\pi}{3}\left(1-\frac{\pi}{3}\right), \frac{\sqrt{3}}{2} + \frac{\pi}{6}\left(1-\frac{\pi}{6}\right)\right]$

Answer: C

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254. Find the domain of the function

$$f(x) = \frac{\cos^{-1}\left(1+x^2\right)}{2x} + \sqrt{\sin(\cos x)}$$

A. [-1, 1]

B. ϕ

C. {-1, 1}

D. (-1, 1)

Answer: C

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255. Consider the following relations R = {(x,y) |x, y are real number and x = wy for some rational number w}, $S = \left\{ \frac{m}{n} \quad \frac{p}{q} \right]$ m,n,p and q are integers such that $n, q \neq 0$ and qm = pn}. Then

A. R is an equivalence relation but S is not an equivalence relation

B. Neither R nor S is an equivalence relation

C. S is an equivalence relation but R is not an equivalence relation

D. R and S both are equivalence relations.

Answer: C

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256. Let W denotes the words in the English dictionary Define the relation R by $R = \{(x, y) \in W \times W$: the words x and y have a least one letter in common} Then, R is

A. reflexive, symmetric and not transitive

B. reflexive, symmetric and transitive

C. reflexive, not symmetric and transitive

D. not reflexive, symmetric and transitive

Answer: A

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257. If $f(x) = \sin x + \cos x, g(x) = x^2 - 1$ then g(f(x)) is invertible in the domain

A. $0, \frac{\pi}{2}\Big]$

B. $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

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

D. $[0, \pi]$

Answer: B

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258. The domain of the function $f(x) = \frac{1}{|x| - x}$

A. R

B. cannot contain a positive real

C. $(-\infty, 0)$

D. $(0, \infty)$

Answer: B::C

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259. If a function satisfies (x-y) f(x+y)-(x+y) f(x-y) = $2\left(x^2y - y^3\right),\ \forall x, y \in R$ and f(1) = 2, 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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260. If f(x) = ax + b and g(x) = cx + d, then f(g(x))=g(f(x)) implies

A. f(a) = g(c)

B. f(b) = g(b)

C. f(d) = g(b)

D. ad + b = bc + d

Answer: C::D

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261. Which of the following functions is not injective ?

A. $f(x) = |x + 1|$, x in [-1, 0)`

B. $f(x) = x + \frac{1}{x}, x \in [0, \infty)$

C. $f(x) = x^2 + 4x - 5$

D. $f(x) = e^{-x}, x \in [0, \infty)$

Answer: B::C

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262. If f(x) is defined on [0, 1) by $f(x) = \begin{cases} x & \text{if } x is rational \\ 1 - x & \text{if } x is irrational \end{cases}$

then for all `x in [0,1], f(f(x)) is

A. real

B. 1 + x

C. x

D. None of these

Answer: A::C

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263. The function f(x) = [x] + sin x ([x] denotes greatest integer $\leq$ x)

A. can not take all real value

B. cannot take all the value 1

C. can take all real value

D. is defined for all x

Answer: A::B::D

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264. Let $f: R \to R$ be defined by f(x) = [x] and $g(x) = \frac{3-2x}{4}$ then

A. f is neither one-one nor onto

B. g is one-one but f is not one-one

C. f is one-one and g is onto

D. neither f nor g is onto

Answer: A::B

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265. If $f(x) = \frac{1}{\sqrt{[\cos x] - [\sin x]}}$((x) denotes greatest integer $\leq$ x)) then

A. Domain of f = R

B. Range of f = {1}

C. Domain of f = $[2n\pi, (2n+1)\pi]$

D. Domain of $f = \left[2n\pi = \frac{\pi}{2}, 2n\pi\right]$

Answer: B::D

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266. The graph of the equation y + |y| - x - |x| = 0` is represented by

A. the x-axis

B. the bisector line of the first quadrant

C. a pair of lines bisecting all the quadrants

D. all point of the third quadrant

Answer: B::D

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267. If $f: R \to R$, defined as $f(x) = \frac{\sin([x]\pi)}{x^2 + xz + 1}$, where [x] is the greatest integer less than or equal to x, then

A. f is one-one

B. f is many-one

C. f is into

D. f is onto

Answer: B::C

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268. Let g(x) be a function defined on [-1, 1] so that the area of the equilateral triangle with two of its vertices at (0, 0) and (x, g(x)) is $\frac{\sqrt{3}}{4}$. The function g(x) I equal to

A. $\sqrt{1 - x^2}$

B. $-\sqrt{1 - x^2}$

C. $\frac{1}{2}\sqrt{1-x^2}$

D. $\frac{\sqrt{3}}{8}\sqrt{1-x^2}$

Answer: A::B

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269. Let $f(x)=\frac{x}{1+x^2}$ and $g(x)=\frac{e^{-x}}{1+[x]}$, where [x] is the greatest integer less than or equal to x. Then

A. $dom(f+g)=R\sim[2,0)$

B. $dom(f\sim g)=R\sim[-1,0)$

C. range f $\cap$ range g = [-2, 1/2]

D. range of f $\cap$ range g = R

Answer: B::D

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270. Let $f(x) = \frac{\log_{100X}(2\log_{10} X + 2)}{-X}$ and g(X) = {X}, where {x} denotes the fractional part of x. If the function fog(x) exists then the domain of f(x) contains

A. (0, 1/100)

B. (1/100, 1/10)

C. (1/10, 1)`

D. $(1, \infty)$

Answer: A::B

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271. If $y = f(x) = \frac{x+2}{x-1}$ then

A. x = f(y)

B. f(1) = 3

C. y increases with x for $x < 1$

D. f is a rational function of x

Answer: A::D

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272. Let f(x) be a real valued function satisfying the functional equation f(x) + f(1 - x) = k for all $x \in Q$, where k is a constant quantity. To evaluate the p and value at a point we use the relations to get the value of that function

Answer the following question based on above passage :

If $f(x) = \frac{4^X}{4^X + 2}$ where $x \in Q$ then

f(1/2007) + f(2/2007) +.....+f(2006/2007) equals to

A. 1003

B. 2006

C. 2007

D. None of these

Answer: A

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273. Let f(x) be a real valued function satisfying the functional equation f(x) + f(1 - x) = k for all $x \in Q$, where k is a constant quantity. To evaluate the p and value at a point we use the relations to get the value of that function

Answer the following question based on above passage :

If f(x) = 3^(x-3)/(3^(1-x) + 3^x)$f \text{ or } al$x in Q`, then the value of the sum f(1/55) + f(2/55) +.....+ f(54/55) is

A. 1

B. 27

C. 54

D. 55

Answer: A

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274. Let f(x) be a real valued function satisfying the functional equation f(x) + f(1 - x) = k for all $x \in Q$, where k is a constant quantity. To evaluate the p and value at a point we use the relations to get the value of that function

Answer the following question based on above passage :

If f(x) = a^x/(a^x + sqrta)(a gt 0) (a gt 0), $then$underset (r=1) overset (2n - 1) sum 2f(r/2n)` is equal to

A. 1

B. 2n

C. 2n- 1

D. $\frac{(2n-1)a}{2}$

Answer: C

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275. Let (x) $f_1(x) - 2f_2(x)$

where $f_1(x) = \min\{x^2, |x|\} \text{for} -1 \leq x \leq 1$

$\max\{x^2, |x| \text{for} |x| > 1$

$f_2(x) = \max\{x^2, |x|\} \text{for} -1 \leq x \leq 1$

$\min\{x^2, |x|\} f \text{ or } |x| > 1$

$g(x) = \begin{cases} \min\{f(t): -3 \leq t \leq x, -3 \leq x \leq o\} \\ \max\{f(t): 0 \leq t \leq x, 0 \leq x \leq 3\} \end{cases}$ $Answer the follow \in g$

-3 le x le -1`, range of g(x) is

A. [-1, 3]

B. [-1 + 15]

C. [-1, 9]

D. None of these

Answer: A

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276. Let (x) $f_1(x) - 2f_2(x)$

where $f_1(x) = \min\{x^2, |x|\} \text{for} -1 \leq x \leq 1$

$\max\{x^2, |x| \text{for} |x| > 1$

$f_2(x) = \max\{x^2, |x|\} \text{for} -1 \leq x \leq 1$

$\min\{x^2, |x|\} f \text{ or } |x| > 1$

`g(x) = {(min{f(t) : -3 le t le x, -3 le x le o}),(max{f(t) : 0 le t le x, 0 le x le 3}):}

Answer the following question based on above passage :

Number of critical points of f(x) is

A. 1

B. 2

C. 3

D. None of these

Answer: C

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277. Let (x) $f_1(x) - 2f_2(x)$

where $f_1(x) = \min\{x^2, |x|\} \text{for } -1 \leq x \leq 1$

$\max\{x^2, |x| \text{for} |x| > 1$

$f_2(x) = \max\{x^2, |x|\} \text{for } -1 \leq x \leq 1$

$\min\{x^2, |x|\} f \text{ or } |x| > 1$

$g(x) = \begin{cases} \min\{f(t) : -3 \leq t \leq x, -3 \leq x \leq o\} \\ \max\{f(t) : 0 \leq t \leq x, 0 \leq x \leq 3\} \end{cases}$ $Answer the follow \in g$

x in (-1, 0), f(x) - g(x) is

A. $x^2 - 2x + 1$

B. $x^2 + 2x - 1$

C. $x^2 + 2x + 1$

D. $x^2 - 2x - 1$

Answer: C

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278. Let $f(x) = \frac{1}{2}\left[f(xy) + f\left(\frac{x}{y}\right)\right]$ for $x, y \in R^+$ such that f(1) = 0

f'(1) = 2

Answer the following question based on above passage :

f(x) - f(y) is equal to

A. $f\left(\frac{y}{x}\right)$

B. $f\left(\frac{x}{y}\right)$

C. f(2x)

D. f(2y)

Answer: B

Watch Video Solution

279. Let $f(x) = \frac{1}{2}\left[f(xy) + f\left(\frac{x}{y}\right)\right]$ for $x, y \in R^+$ such that f(1) = 0

f'(1) = 2

Answer the following question based on above passage :

f'(3) is equal to

A. 1/3

B. 2/3

C. 1/2

D. 1/4

Answer: B

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280. Let $f(x) = \frac{1}{2}\left[f(xy) + f\left(\frac{x}{y}\right)\right]$ for $x, y \in R^+$ such that f(1) = 0

f'(1) = 2

Answer the following question based on above passage :

f€ is equal to

A. 2

B. 1

C. 3

D. 4

Answer: A

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281. For all real values of x and y, 2f(x) cosy = f(x + y) + f(x - y) and b are arbitrary constants.

Answer the following question based on above passage :

f(x) + $f(\pi - x)$ =

A. 2b sinx

B. -2b sinx

C. 2b cosx

D. -2b cosx

Answer: C

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282. For all real values of x and y, 2f(x) cosy = f(x + y) + f(x - y) and b are arbitrary constants.

Answer the following question based on above passage :

f(-x) + $f(\pi - x)$ =

A. 2b sinx

B. -2b sinx

C. 2b cosx

D. None of these

Answer: D

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283. For all real values of x and y, 2f(x) cosy = f(x + y) + f(x - y) and b are arbitrary constants.

Answer the following question based on above passage :

f(x) + f(-x) =

A. 0

B. 2b cosx

C. 2b sinx

D. None of these

Answer: C

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284. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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285. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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286. Let f(x) be function such that $f(x+2)-5f(x+1)+6f(x)=0\,\forall x\in R$match the following List-I

with List-II

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287. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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288. If maximum and minimum value of $f(x) =$ ^xC_(2x-1)+^(20-3x)C_(4x-5)arelambda and mu$respectively, $then$the$value$of$(lambda+mu)/470` must be(where[.] denotes the greatest integer function)

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289. Let f be the function from the set of positive integers to the set of real number such that

$f(1) = 1$

$\sum_{r=1}^{n} rf(r) = n(n+1),\ \forall n \geq 2$,then find the value of 2126f(1063)

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290. The least period of the function $\sin\left(\frac{x[x]}{12}\right) + \cos\left(\frac{nx}{4}\right) + \tan\left(\frac{\pi(x)}{3}\right)$ isλ,then the value of $\left(\frac{\lambda}{3}\right)$ must be (where[.] denotes the greatest integer function)

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291. If maximum and minimum value of $f(x) =$ ^xC_(2x-1)+^(20-3x)C_(4x-5)arelambda and mu$$respectively, then the value of$(lambda+mu)/470` must be(where[.] denotes the greatest integer function)

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292. If the period of the function $\cos(nx)\sin\left(\frac{5x}{n}\right)$ is 3π,then the number of integral values of must be

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293. If $f(x+y) = f(x) + f(y) - xy - 1\,'f$ or allx,y in R $\text{and}\ f(1) = 1,$ then the value of$-sum_(r=1)^5 f(r)/3` must be

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294. Let n(A)=4 and n(B)=6 ,then the number of one one functions from A to B must be M. Then $\sqrt{\frac{M}{10}}$ is equal to ?

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295. If $f(x)f(y)+2=f(x)+f(y)+f(xy)\,\forall x, y \in R$ and f(1)=f'(1)=2, then sgn (f(x)) equals

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296. Let $f:[0,1]\to[0,1]$ defined by $f(x)=\frac{1-x}{1+x}$ for $0\leq x\leq 1$ and let g:[0,1]rarr[0,1] defined by $g(x)=4x(1-x), 0\leq x\leq 1$.if range of fog (x)is $[\alpha, \beta]$,then $\alpha+\beta$ equals

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297. If $f(x)=1+x^2$ and f(g(x))=1+x^2-x^3+x^4`,g(2)=2,then g(3) equals

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298. f(x) is a polynomial satisfying $f(x).\, f(y) = f(x) + f(y) + f(xy) = 2,\ \forall x, y \in Ritisgivent\hat{}$

(1)=2,f(3)=10&f(4)=10 k_1+k_2. $Then$k_2` is

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299. Find the domain of each of the following functions:

$f(x) = \sqrt{x+2}$

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300. Find the domain of each of the following functions:

$$f(x) = \frac{1}{\sqrt{2x^2 - 7x - 4}}$$

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301. Find the domain of each of the following functions:

$f(x) = \sqrt{x^2 - 3x + 2}$

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302. Find the renge of each of the following functions:

$f(x) = \left(x^2 - 5x + 6\right)$

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303. Find the domain of each of the following functions:

$f(x) = \sqrt{\sin x - 1}$

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304. Find the domain of each of the following functions:

$f(x) = \frac{1}{\sqrt{x - 1}}$

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305. Find the range of the following function :

$f(x) = \left(x^2 + 2x + 3\right)$

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306. Find the range of the following function :

$f(x) = \sqrt{x^2 - x + 1}$

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307. Find the range of the following function :

$f(x) = 3\sin x + 4\cos x - 5$

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308. Find the range of the following function :

$f(x) = In(x - [x])$,where[.]denotes the greatest integer function.

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309. Which of the following functions are even/odd, and which are neither even or odd?

$$f(x) = \frac{x^2 + 1}{(x^4 + 1)^2}$$

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310. Which of the following functions are even/odd, and which are neither even or odd?

$f(x) = x^3 + \sec x$

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311. Which of the following functions are even/odd, and which are neither even or odd?

$$f(x) = \log\frac{1+x}{1-x}$$

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312. Which of the following functions are even/odd, and which are neither even or odd?

$$f(x) = \begin{cases} 0 & \text{if x is rational} \\ 1 & \text{if x is irrational} \end{cases}$$

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313. Examine whether the following functions are periodic or not. Write the periods of the following periodic functions.

`f(x)=sin(3x+5)+cos(2x-5)

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314. Examine whether the following functions are periodic or not. Write the periods of the following periodic functions.

f(x)= $f(x) = e^{3\{x-[x]\}}$

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315. Examine whether the following functions are periodic or not. Write the periods of the following periodic functions.

$f(x) = \cos[\pi^2]x - \cos[-\pi^2]x$

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316. Examine whether the following functions are periodic or not. Write the periods of the following periodic functions.

$f(x) = e^{ax}\sin bx$

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317. Let $g:[1,3] \to Ybaeafunctiondef \in edas$ g(x)=ln(x^2+3x+1)`.Then

Determine whether g(x) is one -one or many one.

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318. Let $g:[1,3] \to Ybeafunctiondef \in edas$ g(x)=ln(x^2+3x+1)`.Then

Find the set of Y so that g(x)in onto.

Watch Video Solution

319. Let $g:[1,3] \to Ybeafunctiondef \in edas$ g(x)=ln(x^2+3x+1)

. $Thenf \in d$g^(-1)(x)` if it exist.

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320. Solve the following equations

$x^2 - 4 - [x] = 0$

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321. Solve the following equations

$\left[x^2\right] + 2[x] = 3x, 0 \leq x \leq 2$

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322. If the functions of f and g are defined from the set of real numbers R to R such that $f(x) = e^x, g(x) = 3x - 2$,then find the functions fog and gof . Define co-domain of fog and gof so that they become invertible and also $(gof)^{-1}$ and $(fog)^{-1}$.

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323. Sketch the graph of the following functions:

$f(x) = x + |x|$

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324. Sketch the graph of the following functions:

$f(x) = \sqrt{4 - x^2}$

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325. Sketch the graph of the following functions:

$f(x) = \sqrt{2x + 2}$

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326. Sketch the graph of the following functions:

$f(x) = I \neq x^2$

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327. Sketch the graph of the following functions:

$f(x) = \sin|x|$

Watch Video Solution

328. Sketch the graph of the following functions:

$f(x) = \sin|x|$

Watch Video Solution

329. Sketch the graph of the following functions:

$f(x) = |\sin|x\ ||$

Watch Video Solution

330. Sketch the graph of the following functions:

$f(x) = In\left(1 + x^2\right)$

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331. Sketch the graph of the following functions:

$f(x) = e^{|x|}$

Watch Video Solution

332. Sketch the graph of the following functions:

$f(x) = |In|x\ ||$

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333. Sketch the graph of the following functions:

$f(x) = \frac{8}{2 + x^2}$

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334. Sketch the graph of the following functions:

$f(x) =$ f(x)=(sinx/sqrt(1+tan^2x)+cosx/sqrt(1+cot^2x)`

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335. Find the integral solutions to the equation $[x][y] = x + y$.Show that all the non-integral solution lie on exactly two lines.

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336. Let $f: \left[\frac{1}{2}, \infty\right) \to \left[\frac{3}{4}, \infty\right)$,where $f(x) = x^2 - x + 1$. Find the inverse of $f(x)$.Hence or otherwise solve the equation, $x^2 - x + 1 = \frac{1}{2} + \sqrt{x - \frac{3}{4}}$.

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337. Find the domain of the function $f(x) = \frac{1}{[|x-1|] + [|7-x|] - 6}$, [.] greatest integer functions.

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338. If $f(x)$ is a real valued function which satisfied f(x+3/2)+f(x)+f(x+1)+f(x+1/2) and |f(x)|le2AAx inR, $thenprovedt\hat{}$f(x)` is periodic.

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339. Let $f(x) = \sin\left(\frac{\pi}{6}\sin\left(\frac{\pi}{2}\sin x\right)\right)$ for all $x \in \mathbb{R}$ and $g(x) = \frac{\pi}{2}\sin x$ for all $x \in \mathbb{R}$. Let (f o g)(x)denote $f(g(x))$ and (g o f)(x)$de\neg eg$(f(x)). Then which of the following is (are) true ?

A. Range of f is $\left[-\frac{1}{2}, \frac{1}{2}\right]$

B. Range of fog is $\left[-\frac{1}{2}, \frac{1}{2}\right]$

C. $\lim_{x \to 0} \frac{f(x)}{g(x)} = \frac{\pi}{6}$

D. There is an $x \in \mathbb{R}$ such that $(gof)(x) = 1$

Answer: 1,2,3

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340. If $[0, \pi/2) \to R$ is defined as

$$f(0) = \left| \begin{bmatrix} 1 & \tan\theta & 1 \\ -\tan\theta & 1 & \tan\theta \\ -1 & -\tan\theta & 1 \end{bmatrix} \right|$$

A. $(2, \infty)$

B. $(-\infty, -2]$

C. $[2, \infty)$

D. $(-\infty, 2]$

Answer: 3

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341. $\{x \in R : |\cos x| \geq \sin x\} \cap \left[0, \frac{3\pi}{2}\right] =$

A. $\left[0, \frac{\pi}{4}\right] \cup \left[\frac{3\pi}{4}, \frac{3\pi}{2}\right]$

B. $\left[0, \frac{\pi}{4}\right] \cup \left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$

C. $\left[0, \frac{\pi}{4}\right] \cup \left[\frac{5\pi}{4}, \frac{3\pi}{2}\right]$

D. $\left[0, \frac{3\pi}{2}\right]$

Answer: 1

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342. Let $f[-2, 2] \to R$ be a continuous function such that $f(x)$assumes only irrational values. If $f\left(\sqrt{2}\right) = \sqrt{2}$,

A. $f(0) = 0$

B. $f\left(\sqrt{2} - 1\right) = \sqrt{2} - 1$

C. $f\left(\sqrt{2} - 1\right) = \sqrt{2} + 1$

D. $f\left(\sqrt{2} - 1\right) = \sqrt{2}$

Answer: 4

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343. Let $f: N \to R$ be such that $f(1) = 1$and $f(1) + 2f(2) + 3f(3) + ... + nf(n) = n(n+1)f(n)$ for all $n \in N$, $n \geq 2$, where N is the set of natural numbers and R is the set of real numbers . Then the value of (500) is

A. 1000

B. 500

C. $\frac{1}{500}$

D. $\frac{1}{1000}$

Answer: 4

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344. For the function $f(x) = \left[\frac{1}{[x]}\right]$, where $[x]$ denotes the greatest integer less than or equal to x, which of the following statements are true ?

A. The domain is (-infty, infty)

B. The range is $\{0\} \cup \{-1\} \cup \{1\}$

C. The range is (-infty,0)cup[1,infty)

D. The range is $\{0\}$cup$\{1\}$

Answer: 2,3

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345. Let $f: \left(-\frac{\pi}{2}, \frac{\pi}{2}\right) \to$ R$begivenbyf$(x)=(log)(secx+tan x))^3`

Then

A. $f(x)$ is an odd function

B. $f(x)$ is a one-one function

C. $f(x)$ is a onto function

D. $f(x)$ is an even function

Answer: 1,2,3

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346. If $a \in R$ and the equation

$-3(x-[x])^2+2(x-[x])+a^2=0$

(where [x] denotes the greatest integer $\leq x$) has no integral solution, then all possible values of a lie in the interval:

A. $(-2,\ -1)$

B. $(-\infty,\ -2)\cup(2,\infty)$

C. $(-1,0)\cup(0,1)$

D. $(1,2)$

Answer: 3

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347. Let R be the set of all real numbers $f: R \to R$ be given by $f(x)=3x^2+1$.Then the set $f^{-1},(1,6)$ is

A. $\left\{-\frac{\sqrt{5}}{3}, 0, \frac{\sqrt{5}}{3}\right\}$

B. $\left\{-\frac{\sqrt{5}}{3}, \frac{\sqrt{5}}{3}\right\}$

C. $\left\{-\frac{\sqrt{1}}{3}, \frac{\sqrt{1}}{3}\right\}$

D. $\left(-\frac{\sqrt{5}}{3}, \frac{\sqrt{5}}{3}\right)$

Answer: 2

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348. The function $f(x) = x^2 + bx + c$, where b and c real constants , describes

A. One-to-one mapping

B. onto mapping

C. not one-to-one but onto mapping

D. neither one-to-one nor onto mapping

Answer: 4

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349. The range of the function $y = \left(\frac{\pi^2}{16} + x^2\right)$ is ?

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350. Let $f(x) = 2^{100}x + 1, g(x) = 3^{100}x + 1$

Then the set of real numbers x such that $f(g(x)) = x$ is

A. empty

B. a singleton

C. a finite set with more than one element

D. infinite

Answer: 2

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351. Which of the following real valued functions is/are not even functions?

A. $f(x) = x^3 \sin x$

B. $f(x) = x^2 \cos x$

C. $f(x) = e^x x^3 \sin x$

D. $f(x) = x - [x]$,where $[x]$denotes the greatest integer less than or equal to x

Answer: 3,4

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352. Let $f: R \to R$ be such that f is injective and $f(x)f(y) = f(x+y)f$ or $allx, y \in R$. If $f(x), f(y), f(z)$ are in $G.P.$, then x, y, z are in

A. $A.P. always$

B. $G.\ P.\ always$

C. $A.\ P.\ depend \in gonthevaluesof$x,y,z`

D. $G.\ P.\ depend \in gonthevaluesof$x,y,z`

Answer: 1

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353. The function $f[0, 3] \to [1, 29]$, defined by

$f(x) = 2x^3 - 15x^2 + 36x + 1$,is

A. one-one and onto

B. onto but not one-one

C. one-one but not onto

D. neither one-one nor onto

Answer: 2

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354. Let $f(x) = ax^2 + bx + c, g(x) = px^2 + qx + r$ such that $f(1) = g(1), f(2) = g(2)$ and $f(3) - g(3) = 2$. Then $f(4) - g(4)$ is

A. 4

B. 5

C. 6

D. 7

Answer: 3

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355. The total number of infections (one-one into mappings) from $\{a_1, a_2, a_3, a_4\}$ to$\{b_1, b_2, b_3, b_4, b_5, b_6, b_7\}$ is

A. 400

B. 420

C. 800

D. 840

Answer: 4

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356. Let R be the set of real numbers and the functions $f: R \to R$ and $g: R \to R$ be defined $f(x) = x^2 + 2x - 3$ and $g(x) = x + 1$. Then the value of x for which $f(g(x)) = g(f(x))$ is

A. -1

B. 0

C. 1

D. 2

Answer: 1

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357. Let $f(x) = x^2$ and $g(x) = \sin x$ for all xIR then the set of all x satisfying $(fogogof), (x) = (gogof), (x)$, where $(fog), (x) = f(g(x)),$ is

A. $\pm\sqrt{n}\pi, n \in \{0, 1, 2, ...\}$

B. $\pm\sqrt{n}\pi, n \in \{1, 2, ...\}$

C. $\frac{\pi}{2} + 2n\pi, n \in \{..., -2, -1, 0, 1, 2, ...\}$

D. $2n\pi, n \in \{..., -2, -1, 0, 1, 2, ...\}$

Answer: A

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358. Let $f: (0, 1) \to R$ be defined by $f(x) = b - \frac{x}{1} - bx$, where b is a constant such that $0 < b < 1$ Then

A. $fis \neg \in vertib \leq on$(0,1)`

B. $f \neq f^{-1} on(0, 1)$ and f(b)=1/(f'(0))`

C. $f = f^{-1} on(0, 1)$ and f(b)=1/(f'(0))`

D. f^{-1} is differentiable on $(0, 1)$

Answer: A

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359. The domain of the function $f(x) = \sin^{-1}\left(\frac{8(3)^{x-2}}{1-3^{2(x-1)}}\right)$ is

A. $(-\infty, -1) \cup (1, \infty)$

B. $(-\infty, 0) \cup (0, \infty)$

C. $[2, \infty)$

D. $(-\infty, 0) \cup (2, \infty)$

Answer: D

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360. The domain of the function $f(x) = \frac{1}{\sqrt{|x| - x}}$ is

A. $(0, \infty)$

B. $(-\infty, 0)$

C. $(-\infty, \infty) - \{0\}$

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

Answer: B

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361. The even function of the following is

A. $f(x) = \frac{a^x + a^{-x}}{a^x - a^{-x}}$

B. $f(x) = \frac{a^x + 1}{a^x - 1}$

C. $f(x) = x.\frac{a^x - 1}{a^x + 1}$

D. $f(x) = \log_2\left(x + \sqrt{x^2 + 1}\right.$

Answer: C

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362. If $f(x+2y, x-2y)$=xy, then $f(x, y)$is equal to

A. $\frac{1}{4}xy$

B. $\frac{1}{4}(x^2-y^2)$

C. $\frac{1}{8}(x^2-y^2)$

D. $\frac{1}{8}(x^2+y^2)$

Answer: C

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