MATHS

BOOKS - MODERN PUBLICATION MATHS (KANNADA ENGLISH)

FUNCTIONS

Multiple Choice Questions Level I

1. Let $f(x) = x^3 - \frac{1}{x^3}$, then $f(x) + f\left(\frac{1}{x}\right)$ is equal to :

A. $2x^3$

B. $\frac{2}{x^3}$

C. 0

D. 1

Answer: C

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2. If $[x]^2 - 5[x] + 6 = 0$, where $[.]$ denotes the greatest integer function, then :

A. $x \in [3, 4]$

B. $x \in (2, 3]$

C. $x \in [2, 3]$

D. $x \in [2, 4)$

Answer: D

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3. Range of $f(x) = \frac{1}{1 - 2\cos x}$ is :

A. $\left[\frac{1}{3}, 1\right]$

B. $\left[-1, \frac{1}{3}\right]$

C. $(-\infty, -1] \cup \left[\frac{1}{3}, \infty\right)$

D. $\left[-\frac{1}{3}, 1\right]$

Answer: B

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4. Let $f(x) = \sqrt{1+x^2}$, then :

A. $f(xy) = f(x).\ f(y)$

B. $f(xy) \geq f(x).\ f(y)$

C. $f(xy) \leq f(x).\ f(y)$

D. None of these

Answer: C

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5. Domain of $\sqrt{a^2 - x^2}(a > 0)$ is :

A. $(-a, a)$

B. $[-a, a]$

C. $[0, a]$

D. $(-a, 0]$

Answer: B

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6. The domain of the function f defined by :

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

A. R

B. R^+

C. R^-

D. None of these

Answer: D

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7. If $f(x) = ax + b$ where a and b are integers, $f(-1) = -5$ and $f(3) = 3$, then a and b are equal to :

A. $a = -3, b = -1$

B. $a = 2, b = -3$

C. $a = 0, b = 2$

D. $a = 2, b = 3$

Answer: B

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8. The domain of the function f defined by :

$f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$ is equal to :

A. $(-\infty, -1) \cup (1, 4]$

B. $(-\infty, -1] \cup (1, 4]$

C. $(-\infty, -1) \cup [1, 4]$

D. $(-\infty, -1) \cup [1, 4)$

Answer: A

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9. The domain and range of real function f defined by :

$f(x) = \frac{4-x}{x-4}$ is given by :

A. Domain = R, Range = {-1,1}

B. Domain = R - {1}, Range = R

C. Domain = R - {4}, Range = {-1}

D. Domain = R - {-4}, Range = {-1,1}

Answer: C

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10. The domain and range of real function f defined by

$f(x) = \sqrt{x-1}$ is given by :

A. $\text{Domain} = (1, \infty), \text{Range} = (0, \infty)$

B. $\text{Domain} = [1, \infty), \text{Range} = (0, \infty)$

C. $\text{Domain} = [1, \infty), \text{Range} = [0, \infty)$

D. $\text{Domain} = (1, \infty), \text{Range} = [0, \infty)$

Answer: C

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11. The domain of the function f defined by $f(x) = \frac{x^2 + 2x + 1}{x^2 - x - 6}$ is given by :

A. $R - \{3, -2\}$

B. $R - \{-3, 2\}$

C. $R - [3, -2]$

D. $R - (3, -2)$

Answer: A

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12. The domain and range of the function f given by :

$f(x) = 2 - |x - 5|$ is :

A. $\text{Domain} = R^+, \text{Range} = (-\infty, 1]$

B. $\text{Domain} = R, \text{Range} = (-\infty, 2]$

C. $\text{Domain} = R, \text{Range} = (-\infty, 2)$

D. $\text{Domain} = R^+, \text{Range} = (-\infty, 2]$

Answer: B

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13. Domain of definition of the function $f(x) = \sqrt{3\cos^{-1}(4x) - \pi}$

is equal to

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14. If $f(x) = 1 - \frac{1}{x}$, then $f\left[f\left(\frac{1}{x}\right)\right]$ is :

A. $\frac{1}{x-1}$

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

C. $\frac{1}{1+x}$

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

Answer: B

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15. The composite mapping fog of the maps $f: R \to R, f(x) = \sin x, g: R \to R, g(x) = x^2$ is :

A. $\sin x^2$

B. $(\sin x)^2$

C. $\sin x + x^2$

D. $\frac{\sin x}{x^2}$

Answer: A

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16. Which of the following functions is a polynomial function :

A. $\frac{2x^2 + 7x + 4}{3}$

B. $2x^2 + x^{2/3} + 4$

C. $\frac{x^2 - 1}{x + 4}, x \neq -4$

D. $x^4 + x^3 + 3x^2 - 7x + \sqrt{2}x^{-2}$

Answer: A

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17. Which of the following is a rational function ?

A. $\frac{1}{3}\sqrt{4x^3+4x+7}$

B. $\frac{3x^3-7x+1}{x-2}, x \neq 2$

C. $\frac{3x^5+5x^3+2x+7}{x^{3/2}}, x > 0$

D. $\frac{\sqrt{1+x}}{2+5x}, x \neq -2/5$

Answer: B

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18. Which of the following functions is an even function :

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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19. Which of the following functions is an odd function ,

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

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

C. $f(x) = \log\left(\frac{1 - x}{1 + x}\right)$

D. $f(x) = k(\text{constant})$

Answer: C

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20. The period of $\frac{|\sin x| + |\cos x|}{|\sin x - \cos x|}$ is :

A. 2π

B. π

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

D. $\frac{\pi}{4}$

Answer: B

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21. Which of the following functions from $A = \{x : -1 \leq x \leq 1\}$ to itself is a bijection ?

A. $f(x) = |x|$

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

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

D. $f(x) = \sin\left(\frac{\pi x}{2}\right)$

Answer: D

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22. If f is any function, then $\frac{1}{2}[f(x) + f(-x)]$ is always :

A. one-one

B. neither even nor odd

C. even

D. odd

Answer: C

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23. Which of the following functions is not onto ?

A. $f: R \to R, f(x) = 3x + 5$

B. $f: R \to R^+, f(x) = x^2 + 4$

C. $f: R^+ \to R^+, f(x) = \sqrt{x}$

D. None of these

Answer: B

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24. The domain of $f(x) = \cot^{-1} \frac{x}{\sqrt{x^2 - [x^2]}}, x \in R$ is :

A. R

B. R - {0}

C. $R - \{\pm\sqrt{n}, n \in N\}$

D. None of these

Answer: D

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25. The domain of definition of the function :

$y = 3e^{\sqrt{x^2-1}} \log(x-1)$ is :

A. $(1, \infty)$

B. $[1, \infty)$

C. Set of all reals different from {1}

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

Answer: A

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26. Let [x] denote the greatest integer $\leq$ x. The domain of definition of the function $f(x) = \sqrt{\frac{4 - x^2}{[x] + 2}}$ is :

A. $(-\infty, -2) \cup [-1, 2]$

B. $[0, 2]$

C. $[-1, 2]$

D. $(0, 2)$

Answer: A

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27. The domain of the function : $f(x) = \log(1 - x) + \sqrt{x^2 - 1}$ is :

A. $[-1, 1]$

B. $(1, \infty)$

C. $(0, 1)$

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

Answer: D

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28. The domain of the function $f(x) = \sqrt{\log_{0.5} x}$ is :

A. $(0, 1]$

B. $(0, \infty)$

C. $(0.5, \infty)$

D. $[1, \infty)$

Answer: A

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29. The domain of the function : $f(x) = \sqrt{\log \frac{1}{|\sin x|}}$ is :

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

B. $R - \{n\pi : n \in I\}$

C. $R - (-\pi, \pi)$

D. $R - \{2n\pi : n \in I\}$

Answer: B

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30. The domain of definition of the function :

$f(x) = \sqrt{\log_{10}\left(\frac{5x - x^2}{4}\right)}$ is :

A. $[0, 5]$

B. $(0, 5)$

C. $[1, 4]$

D. $(1, 4)$

Answer: C

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31. The domain of $f(x) = \frac{\sqrt{-\log_{0.3}(x-1)}}{\sqrt{-x^2+2x+8}}$ is :

A. (1,4)

B. (-2,4)

C. (2,4)

D. None of these

Answer: C

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32. The domain of $f(x) = \sqrt{\log(2x - x^2)}$ is :

A. $(0, 1) \cup (1, \infty)$

B. $(0, \infty)$

C. $(1, \infty)$

D. None of these

Answer: D

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33. The domain of definition of the function : $\sqrt[3]{\frac{2x + 1}{x^2 - 10x - 11}}$ is given by :

A. $x \neq -1, x \neq 11$

B. $x > 0$

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

D. $x < 0$

Answer: A

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34. The domain of $f(x) = \sqrt{\left(\frac{1}{\sin x} - 1\right)}$ is :

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

B. $(2n\pi, (2n+1)\pi)$

C. $((2n-1)\pi, 2n\pi)$

D. None of these

Answer: B

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35. The domain of the function : $f(x) = \frac{\sqrt{-\log_{0.3}(x-1)}}{\sqrt{-x^2+2x+8}}$ is :

A. (1,4)

B. (2,4)

C. (-2,4)

D. None of these

Answer: B

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36. The domain of the function : $f(x) = {}^{16-x}C_{2x-1} + {}^{20-3x}P_{4x-5}$ is :

A. {2,3}

B. {2,3,4}

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

D. None of these

Answer: A

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

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

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

C. $[-1, 1] \cup (-\infty, -2) \cup (2, \infty)$

D. None of these

Answer: C

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38. The domain of $f(x) = \sqrt{\log\left(\frac{1}{|\sin x|}\right)}$ is :

A. $R - [-\pi, \pi]$

B. $R - \{n\pi : n \in I\}$

C. $R - \{2n\pi : n \in I\}$

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

Answer: B

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39. Domain of definition of the function : $f(x) = \sqrt{\sin^{-1}(2x) + \frac{\pi}{6}}$

for real valued x, is :

A. $\left[-\frac{1}{4}, \frac{1}{2}\right]$

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

C. $\left(-\frac{1}{2}, \frac{1}{9}\right)$

D. $\left[-\frac{1}{4}, \frac{1}{4}\right]$

Answer: A

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40. The range of the function $f(x) = [x] - x$, where [x] denotes the greatest integer $\leq$ x is :

A. [0,1)

B. (-1,0)

C. (-1,0]

D. None of these

Answer: C

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41. The range of the function $f(x) = \cos[x], -\pi/4 < x < \pi/4$, where [x] denotes the greatest integer $\leq x$, is :

A. $\{1, \cos 1\}$

B. $\{0, -\cos 1\}$

C. $\{0\}$

D. $\{0, -1\}$

Answer: A

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42. The range of the function $f(x) = x - [x]$, where [x] denotes the greatest integer $\leq$ x, is :

A. 1

B. {0}

C. (0,1)

D. [0,1)

Answer: D

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43. The range of the function $\sin([x]\pi)$ is :

A. (0,1)

B. [-1,1]

C. {0}

D. 0

Answer: C

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44. The rangeof the function $y = f(x) = \sin[x], \frac{-\pi}{4} < x < \frac{\pi}{4}$, where [x] denotes the greatest integer $\leq$ x, is :

A. {0,-sin1}

B. $\{0, \pm \sin 1\}$

C. {0,-1}

D. {0}

Answer: A

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45. Which of the following functions is periodic ?

A. $f(x) = x - [x]$

B. $f(x) = \sin \frac{1}{x}, x \neq 0, f(0) = 0$

C. $f(x) = x \cos x$

D. None of these

Answer: A

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46. The period of the function $y = |\sin x| + |\cos x|$ is :

A. π

B. 4π

C. $\pi / 2$

D. 2π

Answer: C

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47. The period of the function : $f(x) = 3\sin\frac{\pi x}{3} + 4\cos\frac{\pi x}{4}$ is :

A. 6

B. 24

C. 8

D. 2π

Answer: B

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48. Let $f(x) = \cos 3x + \sin\sqrt{3}x$. Then f(x) is :

A. a periodic function of period 2π

B. a periodic function of period $\sqrt{3\pi}$

C. not a periodic function

D. None of these

Answer: C

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49. The function $f(x) = \sin\frac{\pi x}{n!} - \cos\frac{\pi x}{(n+1)!}$ is :

A. not periodic

B. periodic, with period 2(n!)

C. periodic with period (n+1)

D. None of these

Answer: D

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50. The funcction $f(x) = x - [x] + \cos x$, where [x] is the greatest integer less than or equal to x, is a :

A. periodic function of period 2π

B. periodic function of period 1

C. periodic fucntion of indeterminate period

D. non-periodic function.

Answer: D

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51. If $f(x) = \frac{3x + 2}{5x - 3}$, then :

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

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

C. $f(f(x)) = -x$

D. $f^{-1}(x) = -\frac{1}{19}f(x)$

Answer: A

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52. If $f(x) = \frac{2^x - 2^{-x}}{2^x + 2^{-x}}$, then $f^{-1}(x)$ is :

A. $\frac{1}{2}\log_2 \frac{x}{1-x}$

B. $\frac{1}{2}\log_2 \frac{1+x}{1-x}$

C. $\frac{1}{2}\log_2 \frac{1+x}{x}$

D. $\frac{1}{2}\log_2 \frac{2+x}{2-x}$

Answer: B

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53. If $f(x) = 1 + \alpha x, \alpha \neq 0$ is the inverse of itself, then the value of α is :

A. -2

B. -1

C. 0

D. 2

Answer: B

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54. Which of the following functions is inverse of itself :

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

B. $g(x) = 5^{\log x}$

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

D. None of these

Answer: A

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55. The inverse of $\frac{10^x - 10^{-x}}{10^x + 10^{-x}}$ is :

A. $\log_{10}(2 - x)$

B. $\frac{1}{2}\log_{10}\left(\frac{1+x}{1-x}\right)$

C. $\frac{1}{2}\log_{10}(2x - 1)$

D. $\frac{1}{4}\log\left(\frac{2x}{2-x}\right)$

Answer: B

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56. If $f:[1,\infty) \to [1,\infty)$ is given by $f(x) = x + \frac{1}{x}$, then $f^{-1}(x)$ equals :

A. $\frac{x + \sqrt{x^2 - 4}}{2}$

B. $\frac{x - \sqrt{x^2 - 4}}{2}$

C. $1 + \sqrt{x^2 - 4}$

D. $\frac{x}{1 + x^2}$

Answer: A

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57. If $f(x) = \frac{3x + 2}{5x - 3}, x \in R - \left\{\frac{3}{5}\right\}$, then :

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

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

C. $f(f(x)) = -x$

D. $f^{-1}(x) = -\frac{1}{19}f(x)$

Answer: A

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58. The inverse of the function $f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}} + 2$ is given by :

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

B. $\log_e\left(\frac{x-1}{3-x}\right)^{1/2}$

C. $\log_e\left(\frac{x}{2-x}\right)^{1/2}$

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

Answer: B

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59. If $\log_{0.3}(x-1) < \log_{0.09}(x-1)$, then x lies in the interval :

A. (-2,-1)

B. (1,2)

C. $(2, \infty)$

D. None of these

Answer: C

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60. Which one of the following is periodic ?

A. $f(x) = x - [x], \text{where} [x] \leq x$

B. $f(x) = x \sin(1/x) \text{for} x \neq 0, f(0) = 0$

C. $f(x) = x \cos x$

D. None of these

Answer: A

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61. The domain of $f(x) = \frac{1}{\sqrt{|\cos x| + \cos x}}$ is :

A. $[-2n\pi, 2n\pi]$

B. $(2n\pi, (2n+1)\pi)$

C. $\left(\frac{(4n+1)\pi}{2}, \frac{(4n+3)\pi}{2}\right)$

D. $\left(\frac{(4n-1)\pi}{2}, \frac{(4n+1)\pi}{2}\right)$

Answer: D

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62. Let $f: R \to R$ be a mapping defined by $f(x) = x^3 + 5$, then $f^{-1}(x)$ is equal to :

A. $(x+5)^{1/3}$

B. $(x-5)^{1/3}$

C. $(5-x)^{1/3}$

D. $5 - x$

Answer: B

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63. Let $f(\theta) = \sin\theta(\sin\theta + \sin 3\theta)$, then $f(\theta)$:

A. ≥ 0 only where $\theta \geq 0$

B. ≤ 0 for all θ

C. ≥ 0 for all real θ

D. ≤ 0 only when $\theta \leq 0$

Answer: C

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64. Let $f(x) = \frac{\alpha x}{x+1}, x \neq 0$, then for what value of α is $f[f(x)] = x$?

A. $\sqrt{2}$

B. $-\sqrt{2}$

C. 1

D. -1

Answer: D

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65. The value of the parameter α for which the function $f(x) = 1 + \alpha x, \alpha \neq 0$, is the inverse of itself is :

A. -2

B. -1

C. 1

D. 2

Answer: B

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66. If $f: [1, \infty) \to [2, \infty)$ is given by $f(x) = x + \frac{1}{x}$, then $f^{-1}(x)$ equals :

A. $\frac{x + \sqrt{x^2 - 4}}{2}$

B. $\frac{x}{1+x^2}$

C. $\frac{x-\sqrt{x^2-4}}{2}$

D. $1+\sqrt{x^2-4}$

Answer: A

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67. 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,f(g(x)) is equal to :

A. x

B. 1

C. f(x)

D. g(x)

Answer: B

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68. Which of the following functions is not periodic ?

A. $|\sin 3x| + \sin^2 x$

B. $\cos \sqrt{x} + \cos^2 x$

C. $\cos 4x + \tan^2 x$

D. $\cos 2x + \sin x$

Answer: B

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69. Let function $f: R \to R$ be defined by $f(x) = 2x + \sin x$ for $x \in R$. Then f is :

A. one-to-one and onto

B. one-to-one but NOT onto

C. onto but NOT one-to-one

D. neither one-to-one not onto.

Answer: A

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70. The function $f(x) = \log\left(x + \sqrt{x^2 + 1}\right)$ is :

A. an odd function

B. a periodic funciton

C. neither an even nor an odd function

D. an even function

Answer: A

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71. A function $f: [0, \infty) \to [0, \infty)$ defined as $f(x) = \frac{x}{1+x}$ is :

A. one-one and onto

B. one-one but not onto

C. onto but not one-one

D. neither one-one nor onto

Answer: B

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72. Range of the function $f(x) = \frac{x^2+x+2}{x^2+x+1}, x \in R$ is :

A. $(1, \infty)$

B. $\left(1, \frac{11}{7}\right)$

C. $\left(1, \frac{7}{3}\right]$

D. $\left(1, \frac{7}{5}\right)$

Answer: C

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73. The range of the function : $f(x) = {}^{7-x}P_{x-3}$ is :

A. {1,2,3}

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

C. {1,2,3,4}

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

Answer: A

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74. If $f: R \to S$ defined by : $f(x) = \sin x - \sqrt{3}\cos x + 1$, is onto, then the interval of S is :

A. [0,3]

B. [-1,1]

C. [0,1]

D. [-1,3]

Answer: D

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Multiple Choice Questions Level Ii

1. If $f(x) = \cos(\log x)$, then :

$f(x).\ f(y) - \frac{1}{2}\left(f\left(\frac{x}{y}\right) + f(xy)\right)$ has the value :

A. -1

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

C. -2

D. None of these

Answer: D

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2. If $f(x) = \cos(\log x)$, then

$f(x^2)f(y^2) - \frac{1}{2}\left[f\left(\frac{x^2}{y^2}\right) + f(x^2y^2)\right]$ has the value :

A. -2

B. -1

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

D. None of these

Answer: D

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3. Let $p(x) = a^2 + bx, q(x) = lx^2 + mx + n.$ If $p(1) - q(1) = 0, p(2) - q(2) = 1$ and $p(3) - q(3) = 4,$ then $p(4) - q(4)$ equals :

A. 0

B. 5

C. 6

D. 9

Answer: D

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4. If $f(x) = \log\left(\frac{1+x}{1-x}\right)$ and $g(x) = \frac{3x + x^3}{1 + 3x^2}$, then $f(g(x))$ is equal to :

A. $f(3x)$

B. $[f(x)]^3$

C. $-f(x)$

D. $3f(x)$

Answer: D

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

A. a constant function

B. a polynomial of degree one in sinx, cosx

C. a polynomial of degree two in sinx, cosx

D. None of these

Answer: A

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6. The function $f(x) = \lambda|\sin x| + \lambda^2|\cos x| + g(\lambda)$ has period equal to $\frac{\pi}{2}$ if λ is :

A. 1

B. 2

C. 3

D. None of these

Answer: A

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7. The range of $f(x) = 6^x + 3^x + 6^{-x} + 3^{-x} + 2$ is :

A. $[-2, \infty)$

B. $(-2, \infty)$

C. $(6, \infty)$

D. $[6, \infty)$

Answer: D

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8. The domain of the function : $y = f(x) = \frac{1}{\log_{10}(1-x)} + \sqrt{x+2}$ is :

A. [-3,-2] excluding (-2.5)

B. [0,1] excluding 0.5

C. [-2,1] excluding 0

D. None of these

Answer: C

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9. The domain of the function : $f(x) = \log_2[\log_3[\log_4 x]]$ is :

A. $x < 4$

B. $x > 4$

C. $0 < x < 2$

D. $2 < x < 4$

Answer: B

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10. If [x] denotes the greatest integer $\leq$ x and $f(x) = \frac{1}{[x]} + \sqrt{(2-x)x}$, then domain of f is :

A. (1,2]

B. [1,2]

C. [0,2]

D. [0,1]

Answer: B

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11. The domain of the function $f(x) = \sqrt{1 - \sqrt{1 - \sqrt{1 - x^2}}}$ is :

A. [0,1]

B. [-1,1]

C. $\{x : x < 1\}$

D. $\{x : x > -1\}$

Answer: B

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12. The domain of the function $f(x) = \sqrt{x - \sqrt{1 - x^2}}$ is :

A. [-1,1]

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

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

D. $\left(-\infty, -\frac{1}{2}\right) \cup \left[\frac{1}{\sqrt{2}}, +\infty\right)$

Answer: B

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13. The domain of the function : $f(x) = \log_{10} \log_{10}\left(1 + x^2\right)$ is :

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

B. $(0, +\infty)$

C. $[0, +\infty)$

D. $(-1, 0)$

Answer: B

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14. Given $f(x): \frac{1}{\sqrt{|x|-x}}$ and $g(x)=\frac{1}{\sqrt{x-|x|}}$, then :

A. $D_f \neq \phi$ and $D_g = \phi$

B. $D_f = \phi$ and $D_g \neq \phi$

C. $D_f = D_g$

D. $D_f = \phi$ and $D_g = \phi$

Answer: A

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15. The function f and g are given by : $f(x) = (x)$, the fractional part of x and $g(x) = \frac{1}{2}\sin[x]\pi$, where [x] denotes the integral part of x, then range of gof is :

A. [-1,1]

B. {-1,1}

C. {0}

D. [0,1]

Answer: C

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16. Let $f(x) = \sin \sqrt{p}x$, where $p = [a] =$ greatest integer less than or equal to a. If the period of f(x) is π, then :

A. $a \in [4, 5]$

B. $a = 4, 5$

C. $a \in [4, 5)$

D. None of these

Answer: C

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17. Let $f: R \to R$ be defined by $f(x) = x^2 + 1$, then the value of $f^{-1}(17)$ and $f^{-1}(-3)$ respectively are :

A. $\{\phi\}, [-4, 4]$

B. $\{-3, 3\}, \{\phi\}$

C. $\{\phi\}, \{-3, 3\}$

D. $\{-4, 4\}, \{\phi\}$

Answer: D

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18. Let x be any real number, then $[x + y] = [x] + [y]$ holds for :

A. $y \in R, y \notin Q$

B. $y \in Q$

C. $y \in R$

D. $y \in I$

Answer: D

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19. $\log_2(\log_3(\log_2 x)) = 1$, then the value of x is :

A. 2^2

B. 2^9

C. 4^2

D. 3^4

Answer: B

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20. Let $f: R \to R$ be a function defined by : $f(x) = \frac{x^2 + 2x + 5}{x^2 + x + 1}$ is :

A. one-one and into

B. one-one and onto

C. many-one and onto

D. many-one and into

Answer: C

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21. Let $f(x) = \frac{\sqrt{\sin x}}{1 + \sqrt[3]{\sin x}}$. If D is the domain of f, then D contains :

A. $(0, \pi)$

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

C. $(2\pi, 4\pi)$

D. $(4\pi, 6\pi)$

Answer: A

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

A. $0 < x \leq 1$

B. $0 \leq x \leq 1$

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

D. $-\infty < x < 1$

Answer: D

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23. Let $X = \{1, 2, 3, 4\}$, then one-one onto mappings $f: X \to X$ such that $f(1) = 1, f(2) \neq 2$ and $f(4) \neq 4$ are given by :

A. $\{(1, 1), (2, 4), (3, 2), (4, 3)\}$

B. $\{(1, 2), (2, 4), (3, 3), (4, 2)\}$

C. $\{(1, 2), (2, 4), (3, 3), (4, 2)\}$

D. None of these

Answer: A

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24. The domain of definition of $f(x) = \dfrac{\log_2(x + 3)}{x^2 + 3x + 2}$ is :

A. $R - \{-1, -2\}$

B. $(-2, \infty)$

C. $R - \{-1, -2, -3\}$

D. $(-3, \infty) - \{-1, -2\}$

Answer: D

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25. The domain of $\sin^{-1}\left[\log_3\left(\frac{x}{3}\right)\right]$ is :

A. [1,9]

B. [-1,9]

C. [-9,1]

D. [-9,-1]

Answer: A

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26. Suppose $f(x) = (x+1)^2$ for $x \geq -1$. If g(x) is the function whose graph is reflection of the graph of f(x) with respect to the line $y = x$, then g(x) equals :

A. $-\sqrt{x} - 1, x \geq 0$

B. $\frac{1}{(x+1)^2}, x > -1$

C. $\sqrt{x+1}, x \geq -1$

D. $\sqrt{x} - 1, x \geq 0$

Answer: D

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27. A function f from the set of natural numbers to integers defined by : $f(n) = \begin{cases} \frac{n-1}{2}, \text{when n is odd} \\ -\frac{n}{2}, \text{when n is even} \end{cases}$ is :

A. onto but not one-one

B. one-one and onto both

C. neither one-one nor onto

D. one-one but not onto

Answer: B

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28. Domain of definition of the function : $f(x) = \frac{3}{4-x^2} + \log_{10}\left(x^3 - x\right)$ is :

A. $(-1, 0) \cup (1, 2)$

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

C. $(-1, 0) \cup (1, 2) \cup (2, \infty)$

D. $(1, 2)$

Answer: C

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29. If $f: R \to R$ satisfies $f(x + y) = f(x) + f(y)$ for all $x, y \in R$ and $f(1) = 7$, then $\sum_{r=1}^{n} f(r)$ is :

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

B. $7n(n+1)$

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

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

Answer: C

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

A. [2,3]

B. [2,3)

C. [1,2]

D. [1,2)

Answer: B

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31. The graph of the function $y = f(x)$ is symmetrical about the line $x = 2$, then :

A. $f(x+2)=f(x-2)$

B. $f(2+x)=f(2-x)$

C. $f(x)=f(-x)$

D. $f(x)=-f(-x)$

Answer: A

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

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

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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33. The natural domain of the function $\sqrt{\sin^{-1}(2x) + \frac{\pi}{6}}, x \in R$ is :

A. $\left[-\frac{1}{4}, \frac{1}{2}\right]$

B. $\left[-\frac{1}{4}, \frac{1}{4}\right]$

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

D. $-\frac{1}{2}, \frac{1}{4}$

Answer: A

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34. Let $f:(-1,1) \to B$ be a function defined by : $f(x) = \tan^{-1}\frac{2x}{1-x^2}$,

then f is both one-one and onto when B is the interval :

A. $\left[0, \frac{\pi}{2}\right)$

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

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

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

Answer: C

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35. For real x, let $f(x) = x^3 + 5x + 1$, , then :

A. f is one-one but not onto R

B. f is onto R but not one-one

C. f is one-one and onto R

D. f is neither one-one nor onto R

Answer: C

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36. Let A and B be two finite sets having m and n elements respectively. If $m \leq n$, the total number of injective functions from A to B is :

A. m^n

B. n^m

C. $n!$

D. $\frac{n!}{(n-m)!}$

Answer: D

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37. The domain of the function : $y = \log_{10}\log_{10}\log_{10}\underset{\leftarrow \text{n times} \rightarrow}{.....}\log_{10} x$ is :

A. $[10^n, +\infty)$

B. $(10^{n-1}, +\infty)$

C. $(10^{n-2}, +\infty)$

D. None of these

Answer: D

View Text Solution

38. If [x] stands for the greatest integer function, then the value of :

$$\left[\frac{1}{2}+\frac{1}{1000}\right]+\left[\frac{1}{2}+\frac{2}{1000}\right]+....+\left[\frac{1}{2}+\frac{99}{1000}\right] \text{ is :}$$

A. 498

B. 499

C. 500

D. 501

Answer: C

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39. A real valued function f(x) satisfies the functional equation :

$f(x-y)=f(x)f(y)-f(a-x)f(a+y)$,

where a is given constant and $f(0)=1$. $f(2a-x)$ is equal to :

A. f(x)

B. $-f(x)$

C. $f(-x)$

D. $f(a)+f(a-x)$

Answer: B

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40. If $f(x) = \begin{cases} x & x \in Q \\ 0 & x \notin Q \end{cases}$ and $g(x) = \begin{cases} x & \notin Q \\ 0 & x \in Q \end{cases}$ then $(f - g)$ will be :

A. one-one onto

B. one-one into

C. many-one onto

D. many-one into

Answer: A

View Text Solution

41. If X and Y are two non-empty sets, where $f: X \to Y$ is function defined such that $f(C) = \{f(x): x \in C\}$ and $f'(D) = \{x: f(x) \in D\}$ for $D \subseteq Y$ for any $A \subseteq X$ and $B \subseteq Y$, then :

A. $f\left(f^{-1}(B)\right) = B$ only if $B = f(x)$

B. $f\left(f^{-1}(B)\right) = B$ only if $B \subset f(x)$

C. $f\left(f^{-1}(B)\right) = B$ only if $B \subseteq f(x)$

D. $f\left(f^{-1}(B)\right)$ never equals B.

Answer: B

View Text Solution

42. The largest interval lying in $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ for which the function : $f(x) = \left[4^{-x^2} + \cos^{-1}\left(\frac{x}{2} - 1\right) + \log(\cos x)\right]$ is defined is :

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

B. $\left(-\frac{\pi}{4}, \frac{\pi}{2}\right)$

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

D. $[0, \pi]$

Answer: C

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43. Let $f: N \to Y$ be a function defined as $f(x) = 4x + 3$, where $Y = \{y \in N, y = 4x + 3 \text{ for some } x \in N\}$.

Show that f is invertible and its inverse is :

A. $g(y) = \frac{y - 3}{4}$

B. $g(y) = \frac{3y + 4}{3}$

C. $g(y) = 4 + \frac{y + 3}{4}$

D. $g(y) = \frac{y+3}{4}$

Answer: A

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Latest Question For Aieee Jee Examinations

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

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

B. $(0, \infty)$

C. $(-\infty, 0)$

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

Answer: C

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2. Let $f(x) = x^2$ and $g(x) = \sin x$ for all $x \in R$. Then the set of all x satisfying :

$(fogogof)(x) = (gogof)(x)$, where $(fog)(x) = f(g(x))$, is :

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

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

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

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

Answer: A

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3. 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: B

Watch Video Solution

4. 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. $(1, 2)$

B. $(-2, -1)$

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

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

Answer: D

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Question From Karnataka Cet Comed

1. The number of one-one and onto mapping from A to B, where $n(A) = 6$ and $n(B) = 7$ is :

A. 1000

B. 12

C. 13

D. 0

Answer: C

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2. Let $f: N \to N$defined by :

$$f(n) = \begin{cases} \frac{n+1}{2} \text{if n is odd} \\ \frac{n}{2} \text{if n is even} \end{cases}$$

A. one-one and onto

B. one-one but not onto

C. onto but not one-one

D. neither one-one nor onto

Answer: B

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3. Suppose $f(x) = (x+1)^2$ for $x \geq -1$. If g(x) is the function whose graph is the reflection of the graph of f(x) in the line y = x,

then g(x) =

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

B. $\sqrt{x}-1$

C. $\frac{1}{(x-1)^2}, x > -1$

D. $\sqrt{x}+1$

Answer: B

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4. The domain of the function $f(x) = \sqrt{\cos x}$ is :

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

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

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

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

Answer: B

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5. In the group $\{1, 2, 3, 4, 5, 6\}$ under multiplication mod 7, $2^{-1} \times 4 =$

A. 1

B. 4

C. 2

D. 3

Answer: C

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6. The group (Z, +) has.....

A. exactly one subgroup

B. only two subgroups

C. no subgroups

D. infinitely many subgroups

Answer: D

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7. The value of $\alpha(\neq 0)$ for which the function $f(x) = 1 + \alpha x$ is the inverse of itself is :

A. -2

B. 2

C. -1

D. 1

Answer: C

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8. If $3x = 5(\mod 7)$, then:

A. x = 2(mod 7)

B. x = 3(mod 7)

C. x = 4(mod 7)

D. None of these

Answer: C

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9. If $f(x) = e^x$ and $g(x) = \log e^x$, then which of the following is TRUE ?

A. $f\{g(x)\} \neq g\{f(x)\}$

B. $f\{g(x)\} = g\{f(x)\}$

C. $f\{g(x)\} + g\{f(x)\} = 0$

D. $f\{g(x)\} - g\{f(x)\} = 1$

Answer: B

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10. The number of bijective functions from the set A to itself, if A contains 108 elements is :

A. 108

B. (108)!

C. $(108)^2$

D. 2^{108}

Answer: D

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11. If $f: R \to R$ is defined by $f(x) = \frac{x}{x^2+1}$ find $f(f(2))$.

A. $\frac{1}{29}$

B. $\frac{10}{29}$

C. $\frac{29}{10}$

D. 29

Answer: B

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12. If $f(x) = 2x^2$, find $\frac{f(3.8) - f(4)}{3.8 - 4}$:

A. 1.56

B. 156

C. 15.6

D. 0.156

Answer: C

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13. Let $f: R \to R$ be defined by $f(x) = \frac{1}{x} \forall x \in R$, then f is _____

A. one-one

B. onto

C. bijective

D. f is not defined

Answer: D

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14. $f(x) = \frac{1}{2} - \tan\left(\frac{\pi x}{2}\right), \ -1 < x < 1$ and $g(x) = \sqrt{(3 + 4x - 4x^2)}$. Find the domain of $(f + g)$

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

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

C. $\left[-\frac{1}{2}, \frac{3}{2}\right]$

D. $(-1, 1)$

Answer: C

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