MATHS

BOOKS - OBJECTIVE RD SHARMA MATHS VOL I (HINGLISH)

MISCELLANEOUS EQUATIONS AND INEQUATIONS

Section I Solved Mcqs

1. The number of real solutions of the equation $e^x = x$ is

A. 1

B. 2

C. 0

D. None of these

Answer: C

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2. The number of real solutions of the equation $e^x = x$ is

A. 0

B. 1

C. 2

D. None of these

Answer: B

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3. How many roots does the following equation possess $3^{|x|}(|2-|x|\ |\ |)=1$?

A. 1

B. 2

C. 3

D. 4

Answer: B

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4. The number of real solutions of the equation $\log_a x = |x|, 0 < a < 1$, is

A. 0

B. 1

C. 2

D. None of these

Answer: B

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5. The number of solutions of the equation

$|x| - \cos x = 0$, is

A. 1

B. 2

C. 3

D. 0

Answer: B

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6. The number of real solutions of the equation x-sinx=0, is

A. 0

B. 1

C. 2

D. infinitely many

Answer: B

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7. The number of real solutions of the equation $\sin(e^x) = 2^x + 2^{-x}$ is

A. 0

B. 1

C. 2

D. infinitely many

Answer: A

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8. The equation $2\sin^2\left(\frac{x}{2}\right)\cos^2 x = x + \frac{1}{x}, 0 < x \leq \frac{\pi}{2}$ has

A. one real solution

B. no real solution

C. infinitely many real solutions

D. None of these

Answer: B

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9. Number of solutions of $\log_4(x-1) = \log_2(x-3)$ is :

A. 3

B. 1

C. 2

D. 0

Answer: B

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10. The equation $||x-2|+a|=4$ can have four distinct real solutions for x if a belongs to the interval $(-\infty,-4)$ (b) $(-\infty,0)\ (4,\infty)$ (d) none of these

A. $(-\infty,4)$

B. $(-\infty,-4)$

C. $(4,\infty)$

D. $[-4,4]$

Answer: B

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11. The equation $\sqrt{x+1}-\sqrt{x-1}=\sqrt{4x-1}$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

Answer: A

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12. The number of solutions of $|[x] - 2x| = 4, \text{where}[x]]$ is the greatest integer less than or equal to x, is

A. 2

B. 4

C. 1

D. infinite

Answer: B

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13. The solution set of equation

$$(x+2)^2 + [x-2]^2 = (x-2)^2 + [x+2]^2,$$

where [.] represents the greatest integer function, is

A. N

B. Z

C. Q

D. R

Answer: B

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14. If $[\sin x] + \left[\frac{x}{2\pi}\right] + \left[\frac{2x}{5\pi}\right] = \frac{9x}{10\pi}$, then number of values of x in $(30, 40)$ is

A. 0

B. 1

C. 2

D. infinite

Answer: B

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15. Let [x] represent the greatest integer less than or equal to x If $\left[\sqrt{n^2+\lambda}\right] = \left[n^2+1\right] + 2$, where $\lambda, n \in N,$ then λ can assume

$(2n+4)d \Leftrightarrow erentvalus$

$(2n+5)d \Leftrightarrow erentvalus$

$(2n+3)d \Leftrightarrow erentvalus$

$(2n+6)d \Leftrightarrow erentvalus$

A. (2n+4) different values

B. (2n+3) different values

C. (2n+5) different values

D. (3n+6) different values

Answer: C

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16. Number of solutions $2^{\sin(|x|)} = 4^{|\cos x|} \in [-\pi, \pi]$ is equal to

A. 2

B. 4

C. 6

D. None of these

Answer: B

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17. Number of roots of $|\sin|x|| = x + |x| \text{in}[-2\pi, 2\pi]$, is

A. 2

B. 3

C. 4

D. 6

Answer: B

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18. Number of solutions of equation

$\log_2 (9-2)^x = 10^{\log 10 (3-x)}$, is

A. 1

B. 2

C. 0

D. None of these

Answer: A

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19. Number of solutions of the equation $x^2 - 2 = [\sin x]$, where [.] denotes the greatest integer function, is

A. 3

B. 4

C. 2

D. 1

Answer: C

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20. If [x] denotes the greatest integer less than or equal to x, then the solutions of the equation 2x-2[x]=1 are

A. $x = n + \frac{1}{2}, n \in N$

B. $x = n - \frac{1}{2}, n \in N$

C. $x = n + \frac{1}{2}, n \in N$

D. $n < x < n + 1, n \in Z$

Answer: C

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21. If $0 < x < 1000$ and $\left[\frac{x}{2}\right] + \left[\frac{x}{3}\right] + \left[\frac{x}{5}\right] = \frac{31}{30}x$, (where $[.]$ denotes the greatest integer function then number of possible values of x.

A. 34

B. 32

C. 33

D. None of these

Answer: C

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22. If $f(\sin x) - f(-\sin x) = x^2 - 1$ is defined for all $x \in R$, then the value of $x^2 - 2$ can be

A. 0

B. 1

C. -1

D. 2

Answer: C

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23. If $[x]^2 = [x+2]$, where [x]=the greatest integer integer less than or equal to x, then x must be such that

A. x=2,-1

B. $x \in [2, 3)$

C. $x \in [1, 0)$

D. None of these

Answer: D

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24. The value of $[\sin x] + [1 + \sin x] + [2 + \sin x]$ in $x \in (\pi, 3\pi/2]$ can be ([.] is the greatest integer function) can be.

A. 0

B. 1

C. 2

D. 3

Answer: A

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25. The solution set of x which satisfies the equation $x^2 + (x+1)^2 = 25$, where (x) is a least integer greater than or equal to x

A. (2,4)

B. $(-5, -4] \cup (2, 3]$

C. $[-4, -3) \cup [3, 4)$

D. None of these

Answer: B

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26. The solution of the equation

$5^{\log_a x} + 5x^{\log_a 5} = 3, a > 0$, is

A. $5^{\log_a 5}$

B. $2^{-\log 5a}$

C. $2^{-\log_a 5}$

D. $2^{\log 5a}$

Answer: B

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27. Number of solutions of the equation $\cos[x] = e^{2x-1}$, $x \in [0, 2\pi]$, where[.] denotes the greatest integer function is

A. 0

B. 1

C. 2

D. infinite

Answer: B

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28. If $3^{x+1} = 6^{\log_2 3}$, then x is equal to

A. 3

B. 2

C. $\log_3 2$

D. $\log_2 3$

Answer: D

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29. The equation

$$\left(x^2 + x = 1\right)^2 + 1 = \left(x^2 + x + 1\right)\left(x^2 - x - 5\right)$$

for $x \in (-2, 3)$ will have number of solutions. 1

b. 2 c. 3 d. 0

A. 2

B. 4

C. 3

D. None of these

Answer: D

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30. If $\left(\sqrt{2}\right)^{x}+\left(\sqrt{3}\right)^{x}=\left(\sqrt{13}\right)^{x/2}$, then the number of real values of x is

A. 2

B. 4

C. 1

D. None of these

Answer: C

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31. The equation $\sqrt{x+3-4\sqrt{x-1}}+\sqrt{x+8-6\sqrt{x-1}}=$ hs

A. no solution

B. one solution

C. two solutions

D. more than two solutions

Answer: D

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32. The solution set of the equation

$$(x)^2 + [x]^2 = (x-1)^2 + [x+1]^2,$$

where (x) denotes the least integer greater than or equal to x and [x] denotes the greatest integer less than or equal to x, is

A. R

B. R-Z

C. R-N

D. None of these

Answer: B

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33. The equation $5^{1+\log_5 \cos x} = \frac{5}{2}$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

Answer: D

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34. The solution set of the equation

$$\left|\frac{x+1}{x}\right| + |x+1| = \frac{(x+1)^2}{|x|}, \text{ is}$$

A. $\{x : x \geq 0\}$

B. $\{x : x > 0\} \cup \{-1\}$

C. $\{-1, 1\}$

D. $\{x : x \geq 1 \quad \text{or} \quad , x \leq -1\}$

Answer: B

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35. The equation $(0.4)^{x-1} = (6.25)^{6x-5}$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

Answer: B

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36. The equation $\left|\frac{x}{x-1}\right| + |x| = \frac{x^2}{|x-1|}$ has

A. exactly one solutions

B. exactly two solutions

C. at most two solutions

D. infinite number of solutions

Answer: D

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37. The equation $\left(\frac{x}{x+1}\right)^2 + \left(\frac{x}{x-1}\right)^2 = a(a-1)$ has Four

real roots if $a > 2$ Four real roots if $a < -1$ Two real roots if `1

A. four real roots, if $a > 2$

B. two real roots, if $1 < a < 2$

C. four real roots for all $a < -1$

D. all the above

Answer: D

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38. The equation $\frac{|x^2 - 4x| + 3}{x^2 + |x - 5|} = 1$ has

A. no real solution

B. exactly one real solutions

C. two real solutions

D. three real solutions

Answer: D

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39. The number of real solutions of the equation

$$\frac{x^2}{1-|x-5|}=1 \text{ is}$$

A. 4

B. 2

C. 1

D. None of these

Answer: D

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40. The number of real roots of the equation

$$\sqrt{1+\sqrt{5}x+5x^2}+\sqrt{1-\sqrt{5}x+5x^2}=4 \text{ is}$$

A. 0

B. 1

C. 2

D. 4

Answer: B

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41. The equation $3^{x-1} + 5^{x-1} = 34$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

Answer: B

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42. The number of real roots of the equation $1 + 3^{x/2} = 2^x$, is

A. 0

B. 1

C. 2

D. None then 2

Answer: B

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43. The number of real roots of the equation

$x^2 + x + 3 + 2\sin x = 0, x \in [-\pi, \pi]$, is

A. 2

B. 3

C. 4

D. None of these

Answer: D

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44. The number of solutions of the equation

$\log_3\left(3+\sqrt{x}\right)+\log_3\left(1+x^2\right)=0$, is

A. 0

B. 1

C. 2

D. more than two

Answer: A

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45. The number of real roots of the equation

$\log_{1/3}\left(1+\sqrt{x}\right)+\log_{1/3}(1+x)=2$, is

A. 0

B. 1

C. 2

D. more than 2

Answer: A

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46. The number of roots of the equation $x^3 + x^2 + 2x + \sin x = 0$ in $(-2\pi, 2\pi)$

A. 1

B. 2

C. 3

D. None of these

Answer: A

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47. Number of real values of x satisfying the equation

$\log_{x^2+6x+8}\left(\log_{2x^2+2x+3}\left(x^2-2x\right)\right)=0$ is equal to

A. no solution

B. exactly one negative solution

C. at most one negative solution

D. exactly two negative solutions

Answer: B

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48. The number of real solutions of equation $2^{\frac{x}{2}} + \left(\sqrt{2}+1\right)^{x} = \left(5+2\sqrt{2}\right)^{\frac{x}{2}}$ is

A. 1

B. 2

C. 4

D. infinite

Answer: A

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49. If $0 < a < 5, 0 < b < 5$ and $\frac{x^2+5}{2} = x - 2\cos(a+bx)$ is satisfied for at least one real x then least value of $\frac{a+b}{\pi}$ is ?

A. $\pi/2$

B. π

C. 3π

D. 4π

Answer: C

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50. If $5^x + \left(2\sqrt{3}\right)^{2x} \geq 13^x$ then the solution set for

A. $[2, \infty)$

B. {2}

C. $(-\infty, 2]$

D. [0,2]

Answer: C

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51. The roots of the equation $2^{x+2}.3^{\frac{3x}{x-1}} = 9$ are given by

A. $\log_2\left(\frac{2}{3}\right), -2$

B. 3,-3

C. $-2, 1 - \frac{\log 3}{\log 2}$

D. $1 - \log\left(\frac{2}{3}\right), 2$

Answer: C

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52. Let

$2\sin^2 x + 3\sin x - 2 > 0 and x^2 - x - 2 < 0 (x$

is measured in radians). Then x lies in the interval

$\left(\frac{\pi}{6}, \frac{5\pi}{6}\right)$ (b) $\left(-1, \frac{5\pi}{6}\right)$ $(-1, 2)$ (d) $\left(\frac{\pi}{6}, 2\right)$

A. $(\pi/6, 5\pi/6)$

B. $(-1, 5\pi/6)$

C. $(-1, 2)$

D. $(\pi/6, 2)$

Answer: D

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53. The equation $2^{|x^2-12|} = \sqrt{e^{|x|\log 4}}$ has

A. no real solution

B. only two real solutions whose sum is zero

C. only two real solutions whose sum is not zero

D. four real solutions whose sum is zero.

Answer: D

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54. The equation $(\sqrt{5}+2)^{|x|}+(\sqrt{5}-2)^{|x|}=18.$ has

A. only one solution

B. two solutions

C. no solution

D. any number of solutions

Answer: B

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55. The set of all values of x, measured in radians, satisfying the two inequalities

$2\cos^2 x < 2 - 3\cos x$ and $x^2 < 4x + 12$, is

A. $(-2, -\pi/3) \cup (\pi/3, 5\pi/3)$

B. $(\pi/3, \pi/2) \cup (3\pi/2, 2/\pi)$

C. (-2,6)

D. $(-2, 1/2)$

Answer: A

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56. The set of values of a for which the inequality, $x^2 + ax + a^2 + 6a < 0$ is satisfied for all $xbelongs(1, 2)$ lies in the interval:

A. $\left(4 - \sqrt{15}, 4 + \sqrt{15}\right)$

B. $\left(5 - \sqrt{21}, 5 + \sqrt{21}\right)$

C. $\left(5 - \sqrt{21}, 4 + \sqrt{15}\right)$

D. $\left(4 - \sqrt{15}, 5 + \sqrt{21}\right)$

Answer: C

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57. Set of all values of $'x'$ satisfying the inequality

`|2x^2-4x-7|

<[1+1/2((costheta)/(costheta/2sintheta/2))^2],-

pi/2lt=theta

A. (-1,3)

B. $\left(1-\sqrt{5}, 1+\sqrt{5}\right)$

C. $\left(1-\sqrt{5}, -1\right) \cup \left(3, 1+\sqrt{5}\right)$

D. None of these

Answer: C

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58. The solution of the inequation $4^{-x+0.5} - 7.2^{-x} < 4, x \in R$ is

A. R

B. $(-2, \infty)$

C. $(2, \infty)$

D. $(2, 7/2)$

Answer: B

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59. If denote the set of all real x for which

$\left(x^2+x+1\right)^x<1$, then S =

A. $(1, \infty)$

B. $(-1, \infty)$

C. $(-\infty, -1)$

D. None of these

Answer: C

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60. The solution set of the inequation

$$\frac{1}{\log_2 x} < \frac{1}{\log_2 \sqrt{x+2}}, \text{ is}$$

A. (0,1)

B. $(2, \infty)$

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

D. None of these

Answer: C

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61. Solve the inequality:

$\log_x 2.\log_{2x} 2.\log_2 4x > 1$

A. $\left(1, 2^{\sqrt{2}}\right)$

B. $\left(1/\sqrt{2}, 1\right)$

C. $\left(2^{\sqrt{-2}}, 1/2\right)$

D. $\left(2^{\sqrt{-2}}, 1/2\right) \cup (2, \infty)$

Answer: D

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62. The value of 'a' for which the equation $4\cos ec^2\pi(a+x)+a^2-4a=0$ has a real solution is

A. 3

B. 4

C. 2

D. 0

Answer: [0,4]

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63. The product of real roots of the equation $|x|^{\frac{6}{5}} - 26|x|^{\frac{3}{5}} - 27 = 0$ is

A. -3^{10}

B. -3^{12}

C. $-3^{12/5}$

D. $-3^{21/5}$

Answer: A

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64. Let $(a_1, a_2, a_3, a_4, a_5)$ denote a re=arrangement of (3,-5,7,4-9), then $a_1x^4 + a_2x^3 + a_3x^2 + a_4 + a_5 = 0$ has

A. at least two real roots

B. all four real roots

C. only imaginary roots

D. None of these

Answer: A

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65. .Number of solutions of equation $2^x + 2^{x-1} + 2^{x-2} = 7^x + 7^{x-1} + 7^{x-2}$ is

A. 4

B. 2

C. 1

D. 0

Answer: C

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66. The least positive onteger for which x $4^x + 8^{(2/3)(x-2)} - 72 - 4^{x-3/2}$ is non-negative, is

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67. The number of solutions of the equation $xe^{\sin x} - \cos x = 0$ in the interval $(0, \pi/2)$, is

A. 1

B. 2

C. 3

D. 4

Answer: A

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68. The value (s) of k for which

$$|x-1|+|x-2|+|x+1|+|x+2|=4k$$

has integer solutions, is (are)

A. 1,2,3,4,5,.....

B. 2,3,4,5,6,.....

C. 1,3,5,7,.....

D. 0,1,2,3,4,5,....

Answer: B

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69. If $k < 0$, then the number of roots of the equation $ke^x - x = 0$, is

A. 0

B. 1

C. 2

D. 3

Answer: B

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70. (i) The positive value of k for which $ke^x - x = 0$ has only one root is

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

B. 1

C. e

D. log 2

Answer: A

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71. If a continous founction of defined on the real line R, assumes positive and negative values in R, then the equation f(x)=0 has a root in R. For example, if it is known that a continuous function f on R is positive at some point and its minimum values is negative, then the equation $f(x) = 0$ has a root in R. Considetr $f(x) = ke^x - x$ for all real x where k is real constant.

For $k > 0$, the set of all values of k for which $ke^x - x = 0$ has two distinct, roots, is

A. $(0, 1/e)$

B. $(1/e, 1)$

C. $(1/e, \infty)$

D. (0,1)

Answer: A

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72. The number of solutions of the equation

$e^{|\sin x|} = \sec x$ for all $x \in (-\pi/2, \pi/2)$ is/are

A. 1

B. 3

C. 5

D. 2

Answer: B

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73. Let $x \in R$, then $\left[\frac{x}{3}\right] + \left[\frac{x+1}{3}\right] + \left[\frac{x+2}{3}\right]$, where [*] denotes the greatest integer function is equal to ...

A. [x]

B. [x]+1

C. [x]-1

D. None of these

Answer: A

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74. The roots of the equation $x^4 - 2x^3 + x - 380 = 0$ are

A. $5, \ -4, \ \frac{1 \pm 5\sqrt{3i}}{2}$

B. $-5, 4, \ \frac{-1 \pm \sqrt{3i}}{2}$

C. $5, 4\frac{-1 \pm \sqrt{3i}}{2}$

D. $-5, \ -4, \ \frac{1 \pm 5\sqrt{3}}{2}$

Answer: A

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75. How many real solutions does the equation $x^7 + 14x^5 + 16x^3 + 30x - 560 = 0$ have?

A. 7

B. 1

C. 3

D. 5

Answer: B

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76. The equation $e^x - x - 1 = 0$ has

A. one other real root

B. two real roots

C. no other real root

D. infinite number of real roots

Answer: C

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77. The number of roots of the equation $\frac{1}{x}+\frac{1}{\sqrt{(1-x^2)}}=\frac{35}{12}$ is

A. 0

B. 1

C. 2

D. 3

Answer: D

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78. The number of integral roots of the equation $x^4 + \sqrt{x^2 + 20} = 22$ is ...

A. 0

B. 2

C. 4

D. 8

Answer: B

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79. The product of the roots of the equation

$3\sqrt{8+x}+3\sqrt{8-x}=1$, is

A. -21

B. -189

C. -9

D. -5

Answer: B

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80. For a $a \leq 0$, determine all real roots of the equation $x^2 - 2a|x - a| - 3a^2 = 0$.

A. 0

B. 1

C. 2

D. infinite

Answer: B

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81. Let S denote the set of all values of the parameter a for which $x + \sqrt{x^2} = a$ has no solution, them S equals

A. (-1,1)

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

C. $[-1, \infty)$

D. $(0, \infty)$

Answer: B

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82. Let (x_0, y_0) be the solution of the following equations In $(2x)^{In2} = (3y)^{\ln 3}$ and $3^{\ln x} = 2^{\ln y}$

Then x_0 is

A. $\frac{1}{6}$

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

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

D. 6

Answer: C

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83. Let a_n denote the number of all n-digit numbers formed by the digits 0,1 or both such that no consecutive digits in them are 0. Let b_n be the number of such n-digit integers ending with digit 1 and let c_n be the number of such n-digit integers ending with digit 0. Which of the following is correct ?

A. 7

B. 8

C. 9

D. 11

Answer: B

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84. Let a_n denote the number of all n-digit numbers formed by the digits 0,1 or both such that no consecutive digits in them are 0. Let b_n be the number of such n-digit integers ending with digit 1 and let c_n be the number of such n-digit integers ending with digit 0. Which of the following is correct ?

A. $a_{17} = a_{16} + a_{15}$

B. $c_{17} \neq c_{16} + c_{15}$

C. $b_{17} \neq b_{16} + c_{16}$

D. $a_{17} = c_{17} + b_{16}$

Answer: A

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85. In the interval $[0, \pi/2]$, the equation $\cos^2 x - \cos x - x = 0$ has

A. no solution

B. exactly one solution

C. exactly two solutions

D. more than two solutions

Answer: B

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86. The number of points in $(-\infty, \infty)$, for which $x^2 - x \sin x - \cos x = 0$, is 6 (b) 4 (c) 2 (d) 0

A. 6

B. 4

C. 2

D. 0

Answer: C

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87. Let a $\in R$ and let f: $R \to R$ be given by f(x) $= x^5 - 5x + a.$ then

A. f(x) has three real roots if $a > 4$

B. f(x) has only one real root if $a > 4$

C. f(x) has three real roots if $a < -4$

D. f(x) has three real roots if $-4 < a < 4$

Answer: B::D

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88. Number of integers in the range of 'c' so that the equation $x^3 - 3x + c = 0$ has all its roots real and distinct is

A. 2

B. 3

C. 4

D. 5

Answer: B

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89. If $f(x)=\{x\}+\{2x\}$` and $g(x)=[x]$. The number of solutions of $f(x)=g(x)$, where $\{.\}$ and $[x]$ are respectively the fractional part and greatest functions, is

A. 1

B. 2

C. 3

D. 4

Answer: C

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90. The number of roots of the equation

$1 + \log_2(1 - x) = 2^{-x}$, is

A. 0

B. 1

C. 2

D. 3

Answer: C

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91. The number of integral values of n such that the equation $2n\{x\} = 3x + 2[x]$has exactly 5 solutions.

A. 2

B. 3

C. 4

D. 0

Answer: B

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92. If x is a solution of the equation $\sqrt{2x+1}-\sqrt{2x-1}=1\left(x\geq\frac{1}{2}\right)$ then $\sqrt{4x^2-1}=$ (i) $\frac{3}{4}$ (ii) $\frac{1}{2}$ (iii) 2 (iv) $2\sqrt{2}$

A. 2

B. $3/4$

C. $2\sqrt{2}$

D. $1/2$

Answer: B

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Exercise

1. The number of real solutions of the equation $e^x = x$ is

A. 0

B. 1

C. 2

D. 3

Answer: B

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2. The number of real solutions of the equation $e^{|x|} - |x| = 0$, is

A. 0

B. 1

C. 2

D. 3

Answer: A

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3. The number of real solutions of the equation $3^{-|x|} - 2^{|x|} = 0$, is

A. 0

B. 1

C. 2

D. 3

Answer: B

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4. The number of real solutions of $\log_2 x + |x| = 0$, is

A. 0

B. 1

C. 3

D. 4

Answer: B

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5. The number of real solutions of the equation $\log_{05} x = |x|$, is

A. 1

B. 0

C. 2

D. 3

Answer: A

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6. The number of solutions of the equation $\cos x + |x| = 0$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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7. The number of solutions of the equation $2\cos\left(\frac{x}{2}\right) = 3^x + 3^{-x}$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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8. The number of solutions of $3^{|x|} = |2 - |x|\,|\,|$, is

A. 0

B. 2

C. 4

D. infinite

Answer: B

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9. If $[x]^2 = [x + 6]$, where [x]= the greatest integer less than or equal to x, then x must be such that

A. x=3,-2

B. $x \in [-2, -1)$

C. $x \in [3, 4)$

D. $x \in [-2, -1) \cup [3, 4)$

Answer: D

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10. The equation $\sqrt{x+1} - \sqrt{x-1} = \sqrt{4x-1}$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

Answer: A

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11. The equation $\sqrt{4x+9} - \sqrt{11x+1} = \sqrt{7x+4}$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

Answer: B

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12. The number of real roots of $\sin(2^x)\cos(2^x) = \frac{1}{4}\left(2^x + 2^{-x}\right)$ is

A. 1

B. 2

C. 3

D. 0

Answer: D

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13. The number of irrational solutions of the equation

$$\sqrt{x^2+\sqrt{x^2+11}}+\sqrt{x^2-\sqrt{x^2+11}}=4,$$ is

A. 0

B. 2

C. 4

D. 11

Answer: B

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14. The total number of roots of the equation $\left|x - x^2 - 1\right| = \left|2x - 3 - x^2\right|$ is

A. 1

B. 2

C. 0

D. infinitely many

Answer: A

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15. If $3^{\frac{x}{2}} + 2^x > 25$ then the solution set is

A. $x \in [4, \infty)$

B. $(4, \infty)$

C. $x \in (-\infty, 4]$

D. $x \in [0, 4]$

Answer: B

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16. Q. if $(\log_5 x)^2 + \log_5 x < 2$ then x belong to the interval

A. $(1/25, 5)$

B. $\left(1/5, 1/\sqrt{5}\right)$

C. $(1. \infty)$

D. None of these

Answer: A

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17. The number of real solutions of the equation

$27^{1/x} + 12^{1/x} = 2.8^{1/x}$, is

A. 1

B. 2

C. 0

D. infinite

Answer: C

Watch Video Solution

18. The set of all real numbers satisfying the inequation

$2^x + 2^{|x|} > 2\sqrt{2}$, is

A. $(1/2, \infty)$

B. $\left(-\infty, \log_2\left(\sqrt{2} - 1\right)\right.$

C. $(-\infty, 1/2)$

D. $[1/2, \infty) \cup \left(-\infty, \log_2\left(\sqrt{2}-1\right)\right)$

Answer: D

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19. The set of all real numbers satisfying the inequation

$x^{(\log_{10} x)^2 - 3(\log 10x) + 1} > 1000$, is

A. (0,1000)

B. $(1000, \infty)$

C. (0,100)

D. None of these

Answer: D

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20. The solution set of the inequality $\log_{\sin\left(\frac{\pi}{3}\right)}(x^2-3x+2) \geq 2$ is

A. $[1/2, 1)$

B. $(2, 5/2]$

C. $[1/2, 1) \cup (2, 5/2]$

D. $[1/2, 5/2]$

Answer: C

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21. The equation $e^x = x(x+1), x < 0$ has

A. no real roots set

B. exactly one real root

C. two real roots

D. infinitely many real roots

Answer: B

Watch Video Solution

22. The solution set of inequation $\log_{1/3}\left(2^{x+2}-4^{x}\right) \geq -2$, is

A. $\left(-\infty, 2-\sqrt{13}\right)$

B. $\left(-\infty, 2+\sqrt{13}\right)$

C. $\left(-\infty, 2\right)$

D. None of these

Answer: D

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23. If $x, y \in R$, then $\frac{1}{2}(x + y + |x - y|) = x$ holds iff

A. $x > y$

B. $x < y$

C. x=y

D. $x \geq y$

Answer: D

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24. The equation $e^{x-8} + 2x - 17 = 0$ has :-

A. 1

B. 2

C. 4

D. 8

Answer: A

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25. The solution set of the inequation

$\log_{1/3}\left(x^2+x+1\right)+1>0$, is

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

B. [-1,2]

C. (-2,1)

D. R

Answer: C

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26. If $\log_3 x - \log_x 27 < 2$, then x belongs to the interval

A. $(1/3, 27)$

B. $(1/27, 3)$

C. $(1/9, 9)$

D. None of these

Answer: D

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27. $\log_{16} x^3 + \left(\log_2 \sqrt{x}\right)^2 < 1$ iff x lies in

A. (2,16)

B. $(0, 1/16)$

C. $(1/16, 2)$

D. (0,2)

Answer: C

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28. The number of solutions of the equation $\log_{x-3}\left(x^3 - 3x^2 - 4x + 8\right) = 3$ is

A. 1

B. 2

C. 3

D. 4

Answer: A

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29. If $0 < a < 1$, then the solution set of the inequation

$$\frac{1 + (\log_a x)^2}{1 + (\log_a x)} > 1, \text{ is}$$

A. $(1, 1/a)$

B. (0,a)

C. $(1, 1/a) \cup (0, a)$

D. None of these

Answer: C

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30. The numebr of solution (s) of the inequation

$$\sqrt{3x^2+6x+7}+\sqrt{5x^2+10x+14}\leq 4-2x-x^2$$

, is

A. 1

B. 2

C. 4

D. infinitely many

Answer: A

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Chapter Test

1. If $3^x + 2^{2x} \geq 5^x$, then the solution set for x, is

A. $(-\infty, 2]$

B. $[2, \infty)$

C. $[0, 2]$

D. $\{2\}$

Answer: A

Watch Video Solution

2. The number of real solutions of the equation $1 - x = [\cos x]$ is

A. 1

B. 2

C. 3

D. 0

Answer: B

 Watch Video Solution

3. The number of solutions of

$[\sin x + \cos x] = 3 + [-\sin x] + [-\cos x]$ in the internal $[0, 2\pi]$ is (where[.] denotes the the greatest integer function).

A. 0

B. 4

C. infinite

D. 1

Answer: C

Watch Video Solution

4. Let $x = \frac{a+2b}{a+b}$ and $y = \frac{a}{b}$, where a and b are positive integers. If $y^2 > 2$, then

A. $x^2 \leq 2$

B. $x^2 < 2$

C. $x^2 > 2$

D. $x^2 \geq 2$

Answer: B

Watch Video Solution

5. The solution set contained in $R$of the following inequation$3^x + 3^{1-x} - 4 < 0$ is

A. (1,3)

B. (0,1)

C. (1,2)

D. (0,2)

Answer: B

Watch Video Solution

6. If $(\sin\alpha)^x + (\cos\alpha)^x \geq 1, 0 < a < \frac{\pi}{2}$ then

A. $x \in [2, \infty)$

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

C. $x \in [-1, 1]$

D. None of these

Answer: B

Watch Video Solution

7. The solution set of the inequation

$5^{(1/4)(\log 5x)^2} \geq 5x^{(1/5)(\log 5x)}$ is

A. $\left(0, 5^{-2\sqrt{5}}\right]$

B. $\left[5^{2\sqrt{5}}, \infty\right)$

C. $\left(0, 5^{-2\sqrt{5}}\right] \cup \left[5^{2\sqrt{5}}, \infty\right)$

D. $(0, \infty)$

Answer: C

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8. The number of real roots of the equation

$x^2 + x + 3 + 2\sin x = 0, x \in [-\pi, \pi]$, is

A. 2

B. 4

C. 6

D. None of these

Answer: D

Watch Video Solution

9. The number of real roots of the equation

$1 + 3^{x/2} = 2^y$, is

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

10. The number of real values of the equation $\sin \pi x = |\ln|x||$ is

A. 2

B. 4

C. 5

D. 6

Answer: D

Watch Video Solution

11. The number of roots of the equation $\left[\sin^{-1} x\right] = x - [x]$, is

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

12. The number of values of a for which the system of equations $2^{|x|} + |x| = y + x^2 + a$ and $x^2 + y^2 = 1$ has only one solution where a,x,y are real, is

A. 1

B. 2

C. finitely many but more than 2

D. infinitely many

Answer: A

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13. The number of real solutions (x, y, z, t) of simultaneous equations $2y = \frac{11}{x} + x$, , $2z = \frac{11}{y} + y$, $2t = \frac{11}{z} + z$, $2x = \frac{11}{t} + t$ is

A. 0

B. 1

C. 2

D. 4

Answer: C

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14. If the sum of the greatest integer less than or equal to x and the least integer than or equal to x is 5, then the solution set for x is

A. [2,3]

B. (0,5)

C. [5,6)

D. [2,3)

Answer: A

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15. If x, y and$z$ are three real numbers such that $x + y + z = 4$ and $x^2 + y^2 + z^2 = 6$,then show that each of x,y and z lie in the closed interval $\left[\frac{2}{3}, 2\right]$

A. $[2/3, 2]$

B. $[0, 2/3]$

C. [0,2]

D. $[-1/3, 2/3]$

Answer: A

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16. Find the product of the real roots of the equation, $x^2 + 18x + 30 = 2\sqrt{x^2 + 18x + 45}$

A. 720

B. 20

C. 36

D. 360

Answer: B

Watch Video Solution

17. $x^8 - x^5 - \frac{1}{x} + \frac{1}{x^4} > 0$, is satisfied for

A. only positive values of x

B. only negative values of x

C. all real numbers except zero

D. only for $x > 1$

Answer: C

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18. The number of solutions of the equation

$$\frac{\left(1+e^{x^2}\right)\sqrt{1+x^2}}{\sqrt{1+x^4-x^2}} = 1+\cos x, \text{ is}$$

A. 1

B. 2

C. 3

D. 4

Answer: A

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19. The number of real roots of the equation

$1 + a_1 x + a_2 x^2 + \ldots\ldots\ldots\ldots a_n x^n = 0,$ where $|x| < \frac{1}{3}$ and $|a_n| < 2$, is

A. n if n is even

B. 1 if n is odd

C. 0 for any $n \in N$

D. None of these

Answer: C

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20. Let a,b be integers and f(x) be a polynomial with integer coefficients such that f(b)-f(a)=1. Then, the value of b-a, is

A. 1

B. -1

C. 1,-1

D. 0,1

Answer: C

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21. Let

$P_n(ix) = 1 + 2x + 3x^2 + \ldots\ldots\ldots + (n+1)x^n$

be a polynomial such that n is even.The number of real roots of $P_n(x) = 0$ is

A. 0

B. n

C. 1

D. n+1

Answer: A

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22. Let

$P_n(ix) = 1 + 2x + 3x^2 + \ldots\ldots\ldots + (n+1)x^n$

be a polynomial such that n is even.The number of real roots of $P_n(x) = 0$ is

A. 0

B. n

C. 1

D. n+1

Answer: C

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23. Let

$P_n(ix) = 1 + 2x + 3x^2 + \ldots\ldots\ldots + (n+1)x^n$

be a polynomial such that n is even.The number of real roots of $P_n(x) = 0$ is

A. $-1 < \alpha < 0$

B. $0 < \alpha < 1$

C. $0 \leq \alpha \leq 1$

D. $-1 \leq \alpha < 0$

Answer: A

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24. Find the number of positive real roots of $x^4 - 4x - 1 = 0$

A. 3

B. 2

C. 1

D. 0

Answer: C

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25. Find the number of positive real roots of $x^4 - 4x - 1 = 0$

A. 3

B. 2

C. 1

D. 0

Answer: C

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26. Find the number of positive real roots of $x^4 - 4x - 1 = 0$

A. 3

B. 2

C. 1

D. 0

Answer: B

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27. Let f(x) be defined by $f(x) = x - [x], 0 \neq x \in R,$ where [x] is the greatest integer less than or equal to x then the number of solutions of $f(x) + f\left(\frac{1}{x}\right) = 1$

A. 0

B. infinite

C. 1

D. 2

Answer: B

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28. The number of negative integral solution of the equation $x^2 2^{x+1} + 2^{|x-3|+2} = x^2 . 2^{|x-3|+4} + 2^{x-1}$ is

A. none

B. only one

C. two

D. four

Answer: A

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29. The number of solutions of

$$\sqrt{3x^2+6x+7}+\sqrt{5x^2+10x+14}=4-2x-x^2$$

, is

A. 1

B. 2

C. 3

D. 4

Answer: A

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30. The number of real solutions of $1 + |e^x - 1| = e^x(e^x - 2)$

A. 1

B. 2

C. 3

D. 4

Answer: A

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