MATHS

BOOKS - ML KHANNA

EXPONENTIAL AND LOGARITHMIC SERIES

Problem Set 1 Multiple Choice Questions

1. The product of the following series

$$\left(1+\frac{1}{1!}+\frac{1}{2!}+\frac{1}{3!}+\ldots\right)\left(1-\frac{1}{1!}+\frac{1}{2!}-\frac{1}{3!}+\ldots\right)$$ is

A. 1

B. e^{-2}

C. $-e^{2}$

D. -1

Answer: A

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2. $\sum_{n=0}^{\infty} \frac{(\log_e X)^n}{n!}$ is equal to

A. $\log_e x$

B. x

C. $\log_x e$

D. none of these

Answer: B

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3. If $S = \sum_{n=0}^{\infty} \frac{(\log x)^{2n}}{(2n)!}$ these S is equal to

A. $x + x^{-1}$

B. $x - x^{-1}$

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

D. none of these

Answer: C

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4. The value of

$(1+3)\log 3 + \frac{(1+3^2)}{2!}(\log 3)^2 + \frac{(1+3^3)}{3!}(\log 3)^3 + \ldots\infty$ is

A. 18

B. 28

C. 36

D. none

Answer: B

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5. If $A = \sum_{n=1}^{\infty} \frac{2n}{(2n-1)!}, B = \sum_{n=1}^{\infty} \frac{2n}{(2n+1)!}$, then AB is equal to

A. 1

B. e^2

C. $\frac{e-1}{e+1}$

D. $\frac{e+1}{e-1}$

Answer: A

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6. The value of

$\left(1 + \frac{a^2x^2}{2!} + \frac{a^4x^4}{4!} + \ldots\right)^2 - \left(ax + \frac{a^3x^3}{3!} + \frac{a^5x^5}{5!} + \ldots\right)^2$ is equal to

A. e^{ax}

B. e^{-ax}

C. 0

D. 1

Answer: D

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7. $\frac{2}{3!}+\frac{4}{5!}+\frac{6}{7!}+$ ..is equal to

A. $2e^{-2}$

B. e^{-2}

C. e^{-1}

D. $2e^{-1}$

Answer: C

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8. $\frac{1}{2!}+\frac{1+2}{3!}+\frac{1+2+3}{4!}+\frac{1+2+3+4}{5!}+\ldots.=$

A. $e/3$

B. $e/4$

C. $e/2$

D. none

Answer: C

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9. If $t_n=\frac{\Sigma n}{n!}$, then th sum of the infinite series Σt_n is equal to

A. e

B. e^{-1}

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

D. $\frac{e}{2}$

Answer: C

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10. The sum of the series $\sum_{n=0}^{\infty} \frac{n^2 - n + 1}{n!}$ is

A. e

B. $\frac{3}{2}e$

C. 2e

D. 3e

Answer: C

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11. If $S_n = \frac{1^2.2}{1!} + \frac{2^2.3}{2!} + \frac{3^2.4}{3!} + ... + \frac{n^2(n+1)}{n!}$, then $\lim_{n \to \infty} \sum S_n$ is equal to

A. 3e

B. 5e

C. 7e

D. 9e

Answer: C

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12. $\frac{1+\frac{2^2}{2!}+\frac{2^4}{3!}+\frac{2^6}{4!}+\ldots}{1+\frac{1}{2!}+\frac{2}{3!}+\frac{2^2}{4!}+\ldots}$

A. e^2+1

B. e^2-1

C. $(e-1)/(e+1)$

D. None

Answer: B

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13. $1+\frac{(\log n)^2}{2!}+\frac{(\log n)^4}{4!}+\ldots\infty=$

A. n

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

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

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

Answer: C

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14. Sum of series $\frac{9}{1!}+\frac{19}{2!}+\frac{35}{3!}+\frac{57}{4!}+\frac{85}{5!}+\ldots$

A. $7e-3$

B. $12e-5$

C. $16e-5$

D. None

Answer: B

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15. The value of $\frac{3}{1!}+\frac{5}{2!}+\frac{9}{3!}+\frac{15}{4!}+\frac{23}{4!}+\ldots\ldots\infty,$

A. $4e-3$

B. $4e+3$

C. $3e-4$

D. $3e+4$

Answer: A

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16. The sum of $\frac{2}{1!}+\frac{6}{2!}+\frac{12}{3!}+\frac{20}{4!}+\ldots$ is

A. $\frac{3e}{2}$

B. e

C. 2e

D. 3e

Answer: D

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17. The sum of the series is $9 + \frac{16}{2!} + \frac{27}{3!} + \frac{42}{4!} + ... \infty$

A. 5e

B. 7e

C. 9e

D. $11e - 6$

Answer: D

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18. The sum of the series $\frac{4}{1!}+\frac{11}{2!}+\frac{22}{3!}+\frac{37}{4!}+\frac{56}{5!}$+..is

A. 6e

B. $6e-1$

C. 5e

D. $5e+1$

Answer: B

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19. The sum of the infinite series

$\frac{2}{1!}+\frac{12}{2!}+\frac{28}{3!}+\frac{50}{4!}+\frac{78}{5!}+\ldots=\ldots\ldots\ldots$

A. e

B. 3e

C. 4e

D. $5e + 2$

Answer: D

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20. $\frac{1.4}{0!} + \frac{2.5}{1!} + \frac{3.6}{2!} + \ldots =$

A. 11e

B. 5e

C. $e - 4$

D. None

Answer: A

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21. $\frac{1^2}{3!} + \frac{2^2}{4!} + \frac{3^2}{5!} +$ ...to ∞ =

A. e

B. 2e

C. $2e - 5$

D. None

Answer: C

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22. $1 + \frac{1+2}{2!} + \frac{1+2+2^2}{3!} + \frac{1+2+2^2+2^3}{4!} + \ldots =$

A. e^2

B. e^{e^2}

C. $e^2 - e$

D. None

Answer: C

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23. $1+\frac{1+a}{2!}+\frac{1+a+a^2}{3!}+\frac{1+a+a^2+a^2}{4!}+\ldots\infty$

A. $\frac{e^a-1}{a-1}$

B. $\frac{e^a-e}{a-1}$

C. $\frac{e^{2a}+1}{a-1}$

D. none

Answer: B

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24. The sum of the series $\frac{1^2.2^2}{1!}+\frac{2^2.3^2}{2!}+\frac{3^2.4^2}{3!}+..$ Is

A. 27 e

B. 24 e

C. 28e

D. none of these

Answer: A

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25. If $x = 1 + 2 + \frac{4}{2!} + \frac{8}{3!} + \frac{16}{4!} + \ldots$ then x^{-1} is equal to

A. e^{-2}

B. e^{2}

C. $e^{1/2}$

D. non of these

Answer: A

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26. If $S = \sum_{n=2}^{\infty} {}^{n}C_{2} \frac{3^{n-2}}{n!}$, then 2S equals

A. $e^{3/2}$

B. e^{3}

C. $e^{-3/2}$

D. e^{-3}

Answer: B

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27. If $S = \sum_{n=1}^{\infty} \left[\frac{C_0 + {}^nC_1 + {}^nC_2 + \ldots \quad {}^nC_n}{{}^nP_n} \right]$ then S =

A. $e^2 + 1$

B. e^2

C. $e^2 - 1$

D. none

Answer: C

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28. If $e^x = \left\{t + \sqrt{1+t^2}\right\}$ then the value of t is

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

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

C. $\left(e^x + e^{-x}\right)$

D. none

Answer: B

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29. The sum of the series

$$\frac{1}{1.2} + \frac{1.3}{1.2.3.4} + \frac{1.3.5}{1.2.3.4.5.6} + \ldots \text{ to } \infty, \text{ is}$$

A. $e - 1$

B. $e^{1/2} - 1$

C. $e^{1/2} + e$

D. none of these

Answer: B

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30. IF S_n denotes the sum of the products of the first n natural numbers taken are at a time then $\sum_{n=0}^{\infty} \frac{S_n}{n!}$ equals

A. $\frac{11e}{24}$

B. $\frac{11e}{12}$

C. $\frac{13e}{24}$

D. none of these

Answer: A

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31. Sum of infinity the series

$$1+\frac{1^2+2^2}{2!}+\frac{1^2+2^2+3^2}{3!}+\ldots=$$

A. 11e

B. 13e

C. $\frac{17}{6}e$

D. $\frac{5}{3}e$

Answer: C

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32. The coefficent of x^n in the series

$$1+\frac{a+bx}{1!}+\frac{(a+bx)^2}{2!}+\frac{(a+bx)^3}{3!}+\ldots\text{is}$$

A. $\frac{b^n}{n!}$

B. $\frac{e^b n^n}{n!}$

C. $\frac{e^a b^n}{n!}$

D. $\frac{e^b a^n}{n!}$

Answer: C

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33. Cofficient of x^4 in the expansion of $\frac{1-3x+x^2}{e^x}$ is

A. $\frac{5}{24}$

B. $\frac{25}{24}$

C. $\frac{4}{25}$

D. $\frac{24}{25}$

Answer: B

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34. The expansion of $\left[1+\frac{x^2}{2!}+\frac{x^4}{4!}+\ldots\right]^2$ in ascending powers of x is

A. $1+\frac{x^2}{2!}+\frac{x^4}{4!}+\frac{x^6}{6!}+\ldots$

B. $1+\frac{2^2x^2}{2!}+\frac{2^4x^4}{4!}+\ldots$

C. $1+\frac{2x^2}{2!}+\frac{2^3x^4}{4!}+\frac{2^5x^6}{6!}+\ldots$

D. None of these

Answer: C

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35. The coefficient of x^n in the expansion of $\left(1+\frac{x^2}{2!}+\frac{x^4}{4!}+\ldots\right)^2$, when n is odd is

A. $\frac{2^{2n}}{(2n)!}$

B. $\frac{2^n}{n!}$

C. 0

D. none

Answer: C

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36. The value of $(x+y)(x-y)+\frac{1}{2!}(x+y)(x-y)\left(x^2+y^2\right)+\frac{1}{3!}(x+y)(x-y)\left(x^4+$

... is :

A. $e^{x^2}-e^{y^2}$

B. $e^{x^2}+e^{y^2}$

C. e^x-y^2

D. none of these

Answer: A

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37. If $S=\sum_{n=2}^{\infty}\frac{{}^nC_2}{(n+1)!}$ then S =

A. $e/2$

B. $e/2-1$

C. $e/2+1$

D. none

Answer: A

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38. The coefficient of x^n in the expansion of $\frac{e^{7x}+e^x}{e^{3x}}$ is

A. $\frac{4^{n-1}+(-2)^n}{n!}$

B. $\frac{4^{n-1}+2^n}{n!}$

C. $\frac{4^{n-1}+(-2)^{n-1}}{n!}$

D. $\frac{4^n+(-2)^n}{n!}$

Answer: D

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39. The coefficient of x^n in the expansion of $\frac{1-ax-x^2}{e^x}$ is

A. $\frac{(-1)^n}{n!}\{-n^2-n(a+1)+1\}$

B. $\frac{(-1)^n}{n!}\{n^2-n(a+1)-1\}$

C. $\frac{(-1)^n}{n!}\{-n^2+n(a+1)+1\}$

D. none

Answer: C

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40. If $\frac{e^x}{1-x}=B_0+B_1x+B_2x^2+\ldots+B_nx^n+\ldots$, then the value of B_n-B_{n-1} is

A. $\frac{1}{n!}$

B. $\frac{1}{(n-1)!}$

C. $\frac{1}{n!}\frac{1}{(n-1)!}$

D. 1

Answer: A

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41. Let $a = \sum_{n=0}^{\infty} \frac{x^{3n}}{(3n)}!, b = \sum_{n=1}^{\infty} \frac{x^{3n-2}}{3n-2}!$ and $C = \sum_{n=1}^{\infty} \frac{x^{3n-1}}{3n-1}!$ and w be a complex cube root of unity

Statement 1: a+b+c $= e^x, a + bw + cw^2 = e^{wx}$ and $a + bw^2 + cw = e^{w^2}$

Statement 2: $a^3 + b^3 + C^3 - 3abc = 1$

A. 1

B. 0

C. -1

D. -2

Answer: A

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42. $1.3 + \frac{2.4}{1.2} + \frac{3.5}{1.2.3} + \frac{4.6}{1.2.3.4} + \ldots$

A. e

B. 2e

C. 3e

D. 4e

Answer: D

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43. $\frac{1^2}{2!} + \frac{2^2}{3!} + \frac{3^2}{4!} + \ldots =$

A. 2e

B. $3e - 1$

C. $2e - 1$

D. $e - 1$

Answer: D

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44. $1+\frac{2^3}{2!}+\frac{3^3}{3!}+\frac{4^3}{4!}+\ldots\infty=$

A. 3e

B. 5e

C. 6e

D. 7e

Answer: B

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45. Then sum of the series

$1+\frac{1\mid 3}{2!}x+\frac{1|3|5}{3!}x^2+\frac{1+3+5+7}{4!}x^3$x+...is

A. xe^x

B. $(x+1)e^x$

C. $4e^x$

D. $(x-2)e^x$

Answer: B

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46. Sum of the series $\log_e 2 + \frac{(\log_e 2)^2}{2!} + \frac{(\log_e 2)^3}{3!} + \ldots =$

A. 3

B. 2

C. 1

D. 0

Answer: C

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47. $\frac{1+\frac{1}{2!}+\frac{2}{3!}+\frac{2^2}{4!}+\frac{2^2}{5!}+\ldots}{1+\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+\ldots}$ is equal to

A. $\frac{e}{2}$

B. e^2-1

C. $\frac{e+1}{e-1}$

D. 4e

Answer: A

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48. Sum the series $\frac{2}{3!}+\frac{4}{5!}+\frac{6}{7!}+\frac{8}{9!}+\ldots$

A. e

B. 2e

C. e^{-1}

D. None

Answer: C

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Problem Set 1 True And False

1. $\frac{\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+\ldots\ldots}{\frac{1}{1!}+\frac{1}{3!}+\frac{1}{5!}+\ldots\ldots}=$

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2. $\frac{2}{1!}+\frac{4}{3!}+\frac{6}{5!}+\frac{8}{7!}+\ldots\infty=e$

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3. $\frac{e^2+1}{e^2-1}=\frac{1+\frac{1}{2!}+\frac{1}{4!}+\frac{!}{6!}+\ldots}{1+\frac{1}{3!}+\frac{!}{5!}+\frac{1}{7!}+\ldots}$

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4. $1+\frac{1+a}{2!}+\frac{1+a+a^2}{3!}+\frac{1+a+a^2+a^3}{4!}+\ldots=\frac{e-e^a}{1-a}$

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Problem Set 1 Fill In The Blanks

1. The sum of the infinite series

$\frac{2}{1!}+\frac{12}{2!}+\frac{28}{3!}+\frac{50}{4!}+\frac{78}{5!}+\ldots=\ldots\ldots\ldots$

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2. $\frac{2}{1}.\frac{1}{3}+\frac{3}{2}.\frac{1}{9}+\frac{4}{3}.\frac{1}{27}+\frac{5}{4}.\frac{1}{81}+\ldots=\ldots\ldots\ldots$

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3. $\frac{1}{2}+\frac{3}{2}.\frac{1}{4}+\frac{5}{3}.\frac{1}{8}+\frac{7}{4}.\frac{1}{16}+\ldots=$ .....

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4. $1+\frac{3}{1!}+\frac{5}{2!}+\frac{7}{3!}+\frac{9}{4!}+\ldots=$ .....

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5. $\frac{2}{1!}+\frac{6}{2!}+\frac{12}{3!}+\frac{20}{4!}+\ldots.=$ .....

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Problem Set 2 Multiple Choice Questions

1. The sum of the series

$\left(\frac{a-b}{a}\right)+\frac{1}{2}\left(\frac{a-b}{x}\right)^2+\frac{1}{3}\left(\frac{a-b}{a}\right)^3+\ldots.\infty$ is

A. $\log ab$

B. $\log\left(\frac{b}{a}\right)$

C. $\log\left(\frac{a}{b}\right)$

D. $\log a^b$

Answer: C

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2. $e^{(x-1)-\frac{1}{2}(x-1)^2+\frac{1}{3}(x-1)^3-\frac{1}{4}(x-1)^4+\ldots}$

A. x

B. $x-1$

C. $\log x$

D. $\log(x-1)$

Answer: A

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3. If $y = x - \frac{x^2}{2} + \frac{x^3}{3} - \ldots$ then x =

A. $\log(1 + y)$

B. e^y

C. $e^{-y} - 1$

D. $y + \frac{y^2}{2!} + \frac{y^3}{3!} + \ldots$

Answer: D

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4. The sum of the series $\log_4 2 - \log_8 2 + \log_{16} 2 - \ldots$is

A. e^2

B. $\log_e 2 + 1$

C. $\log_e 3 - 2$

D. $1 - \log_e 2$

Answer: D

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5. If $S = \frac{1}{1.2} - \frac{1}{2.3} + \frac{1}{3.4} - \frac{1}{4.5} + \ldots\infty$

A. $2\log 2 - 1$

B. $3\log 2$

C. $\log(4/e)$

D. None

Answer: A::C

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6. The sum of the series $\frac{1}{2.3} + \frac{1}{4.5} + \frac{1}{6.7} + \ldots\infty =$

A. $\log(2e)$

B. $\log(e/2)$

C. $\log(4/e)$

D. none

Answer: B

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7. $\frac{1}{1.3}+\frac{1}{2.5}+\frac{1}{3.7}+\frac{1}{4.9}+\ldots$ is equal to

A. $2-\log 2$

B. $1+\log 2$

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

D. none

Answer: A

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8. $1+\frac{2}{1.2.3}+\frac{2}{3.4.5}+\frac{2}{5.6.7}+\ldots=$

A. $\log_3 4$

B. $2\log_e 2$

C. $2\log 3$

D. None

Answer: A::B

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9. $\frac{1}{1.3.5}+\frac{1}{3.5.7}+\frac{1}{5.7.9}+\ldots\infty$

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

B. $\frac{1}{8}$

C. $3\log 2$

D. $\frac{1}{12}$

Answer: D

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10. Sum of the series $\frac{1}{1 \cdot 2 \cdot 3} + \frac{5}{3 \cdot 4 \cdot 5} + \frac{9}{5 \cdot 6 \cdot 7} + \ldots$ is equal to

A. $\frac{3}{2} - 3\log 2$

B. $\frac{5}{2} - 3\log_e 2$

C. $1 - 4\log_e 2$

D. None

Answer: B

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11. Sum of n terms of the series $\frac{1}{1.2.3.4.} + \frac{1}{2.3.4.5} + \frac{1}{3.4.5.6} + \ldots.$

A. $\frac{5}{2} - \log 2$

B. $\frac{3}{2} - \log 2$

C. $\frac{1}{6}\log 2 - \frac{1}{24}$

D. None

Answer: C

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12. If $y + \frac{y^3}{3} + \frac{Y^5}{5} + \ldots\infty = 2\left(x + \frac{x^3}{3} + \frac{x^5}{5} + \ldots\infty\right)$, then

A. $y = 2x$

B. $\log y = 2\log x$

C. $x^2 y = 2x - y$

D. none of these

Answer: C

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13. The coefficient of x^n in the exansion of $\log_e\left(1+3x+2x^2\right)$ is

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

B. $\frac{(-1)^{n+1}}{n}(2^n+1)$

C. $\frac{2^n+1}{n}$

D. none of these

Answer: B

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14. The value of $\log 2+2\left(\frac{1}{5}+\frac{1}{3}.\frac{1}{5^3}+\frac{1}{5}.\frac{1_{\square}}{5^5}+..+\infty\right)$ is

A. log 3

B. 2 log 3

C. 3 log 3

D. none

Answer: A

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15. $2\left[\frac{1}{2x+1}+\frac{1}{3(2x+1)^3}+\frac{1}{5(2x+1)^5}+\frac{1}{5(2x+1)^5}+\ldots\right]$ is equal to ,

A. $\log\left(\frac{x}{x+1}\right)$

B. $\log\left(\frac{x+1}{x}\right)$

C. $\log(2x+1)$

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

Answer: B

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16. $2\left\{\frac{m-n}{m+n}+\frac{1}{3}\left(\frac{m-n}{m+n}\right)^3+\frac{1}{5}\left(\frac{m-n}{m+n}\right)^5+..\right\}$ is equals to

A. $\log\left(\frac{m}{n}\right)$

B. $\log\left(\frac{n}{m}\right)$

C. $\log mn$

D. none of these

Answer: A

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17. The sum of the series

$$1+\left(\frac{1}{2}+\frac{1}{3}\right)\frac{1}{4}+\left(\frac{1}{4}+\frac{1}{5}\right)\frac{1}{4^2}+\left(\frac{1}{6}+\frac{1}{7}\right)\frac{1}{4^3}+\ldots\infty$$

A. $\log\sqrt{6}$

B. $\log\sqrt{3}$

C. $\log\sqrt{12}$

D. none

Answer: C

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18. The series expansion of $\log\left\{(1+x)^{1+x}(1-x)^{1-x}\right\}$ is

A. $2\left[\frac{x^2}{1.2}+\frac{x^4}{3.4}+\frac{x^6}{5.6}+\ldots\right]$

B. $\left[\frac{x^2}{1.2}+\frac{x^4}{3.4}+\frac{x^6}{5.6}+\ldots\right]$

C. $2\left[\frac{x^2}{1.2}+\frac{x^4}{2.3}+\frac{x^6}{3.4}+\ldots\right]$

D. none of these

Answer: A

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19. The coefficient of x^6 in the expansion of $\log\{(1+x)^{1+x}(1-x)^{1-x}\}$ is

A. $\frac{1}{15}$

B. $\frac{1}{30}$

C. $\frac{1}{10}$

D. $\frac{1}{45}$

Answer: A

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20. 2log x-log(x+1)-log(x-1) is equals to

A. $x^2+\frac{1}{2}x^4+\frac{1}{3}x^6+\ldots$

B. $\frac{1}{x^2}+\frac{1}{2x^4}+\frac{1}{3x^6}+\ldots$

C. $-\left[\frac{1}{x^2}+\frac{1}{2x^4}+\frac{1}{3x^6}+\ldots\right]$

D. none of these

Answer: B

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21. The coefficient of x^n, where n = 3k in the expansion of $\log\left(1+x+x^2\right)$ is equal to

A. $-2/n$

B. $2/n$

C. $1/n$

D. $-1/n$

Answer: A

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22. The coefficient of x^n in the expansion of $\log_e\left(\frac{1}{1+x+x^2+x^3}\right)$ when is odd, is equal to

A. $-2/n$

B. $-1/n$

C. $1/n$

D. none of these

Answer: B

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23. If $\log\left(1-x+x^2\right)=a_1x+a_2x^2+a_3x^3+\ldots$

then $a_3+a_6+a_9+..$ is equal to

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

B. $(-1)^n\frac{1}{n}$

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

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

Answer: D

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24. The coefficient of n^{-r} in the expansion of $\log_{10}\left(\frac{n}{n-1}\right)$ is

A. $\frac{1}{r\log 10}$

B. $\frac{1}{r\log 10}$

C. $\frac{1}{(r!)\log 10}$

D. $-\frac{1}{(r!)\log 10}$

Answer: A

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25. If $\log\left(1-x+x^2\right)=a_1x+a_2x^2+a_3x^3+\ldots$

then $a_3+a_6+a_9+..$ is equal to

A. $\log 2$

B. $\frac{2}{3}\log 2$

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

D. $2\log 2$

Answer: B

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26. The sum of the series

$\frac{1}{2}x^2 + \frac{2}{3}x^3 + \frac{3}{4}x^4 + \frac{4}{5}x^5 + \ldots$ equal to

A. $\frac{x}{1+x} + \log(1+x)$

B. $\frac{x}{1-x} + \log(1-x)$

C. $-\frac{x}{1+x} + \log(1+x)$

D. none of these

Answer: B

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27. If x, y, z are three consecutive positive integers, then

$$\frac{1}{2}\log_e x + \frac{1}{2}\log_e z + \frac{1}{2xz+1} + \frac{1}{3}\left(\frac{1}{2xz+1}\right)^3 + \ldots \text{ is equal to}$$

A. $\log_e x$

B. $\log_e y$

C. $\log_e z$

D. none of these

Answer: B

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28. If $S = \dfrac{\left(y-1-\frac{1}{2}(y-1)^2+\frac{1}{3}(y-1)\right)^3}{a-1-\frac{1}{2}(a-1)^2+\frac{1}{3}(a-1)^3}$.... Then S is equal to

A. $\log_e Y$

B. $\log_a y$

C. $\log_e a$

D. $\log_y a$

Answer: B

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Problem Set 2 True And False

1. $\log(n+1) - \log n$

$$= 2\left[\frac{1}{2n+1} + \frac{1}{3(2n+1)^3} + \frac{1}{5(2n+1)^5} + \ldots\right]$$

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2. $\log_e(n+1) - \log_e(n-1) = 2\left[\frac{1}{n} + \frac{1}{3}\cdot\frac{1}{n^3} + \frac{1}{5}\cdot\frac{1}{n^5} + \ldots\right]$

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3. If $y = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \frac{1}{4}x^4 + \ldots$ then

$x = y + \frac{y^2}{2!} + \frac{y^3}{3!} + \frac{y^4}{4!} + \ldots$

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4.

$$3\log_e(1+x) - \log_e x - \left\{\frac{1}{(1+x)^3} + \frac{1}{2}\frac{1}{(1+x)^6} + \frac{1}{3}\frac{1}{(1+x)^9} + \ldots\right\}$$

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

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5. If α, β are the roots of the equation $ax^2 + bx + c = 0$, prove that

$$\log_e\left(ax^2 + bx + c\right) = \log_e a + 2\log_e x - \frac{1}{x}(\alpha + \beta) - \frac{1}{2x^2}\left(\alpha^2 + \beta^2\right) - \frac{}{3}$$

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6. If $f = \frac{x}{1+x^2} + \frac{1}{3}\left(\frac{x}{1+x^2}\right)^3 + \frac{1}{5}\left(\frac{x}{1+x^2}\right)^5 + \ldots$ and $g = x - \frac{2}{3}x^3 + \frac{1}{5}x^5 + \frac{1}{7}x^7 - \frac{2}{9}x^9 + \ldots$ then $f \equiv g$.

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7. If $x^2y = 2x - y,$ and x^2 is less than 1, show that $4\left(x^2 + \frac{X^6}{3} + \frac{x^{10}}{5} + \ldots\right) = y^2 + \frac{y^4}{2} + \frac{y^6}{3} + \ldots$

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Problem Set 2 Self Assessment Test

1. The value of 1- log 2 + $\frac{\log 2^2}{2} - \frac{(\log 2)^3}{3} + \cdots$ is

A. 12

B. $1/2$

C. log 3

D. log 2

Answer: B

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2. The coefficient of x^n in the expansion of $\frac{e^{7x}+e^x}{e^{3x}}$ is

A. $\frac{4^{n-1}+(-2)^n}{n!}$

B. $\frac{4^{n-1}+2^n}{n!}$

C. $\frac{4^{n-1}+(-2)^{n-1}}{n!}$

D. $\frac{4^n+(-2)^n}{n!}$

Answer: D

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3. The sum of the series $\frac{1}{2!}-\frac{1}{3!}+\frac{1}{4!}-\frac{1}{5!}$+....up to ∞ is

A. e

B. $e^{-1/2}$

C. e^{-2}

D. e^{-1}

Answer: D

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4. $\frac{2}{1!}+\frac{4}{3!}+\frac{6}{5!}+\frac{8}{7!}+\ldots\infty=$

A. e^{-1}

B. e

C. 2e

D. 3e

Answer: B

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5. Let $n = 2006!$ Then $\frac{1}{\log_2 n} + \frac{1}{\log_3 n} + \ldots + \frac{1}{\log_{2006} n} =$

A. 2006

B. 2005

C. 2005!

D. 1

Answer: D

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6. The sum of the series $1 + \frac{1}{4.2!} + \frac{1}{16.4!} + \frac{1}{64.6!} + \ldots \infty$ is

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

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

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

D. e^{-}

Answer: B

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7. $\frac{1}{1.3}+\frac{1}{2.5}+\frac{1}{3.7}+\frac{1}{4.9}+\ldots$ is equal to

A. $2\log_e 2-2$

B. $2-\log_e 2$

C. $2\log_e 4$

D. $\log_e 4$

Answer: B

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8. The sum of the series $\frac{4}{1!}+\frac{11}{2!}+\frac{22}{3!}+\frac{37}{4!}+\frac{56}{5!}+..$is

A. 6e

B. $6e - 1$

C. 5e

D. $6e + 2$

Answer: B

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