



## MATHS

### BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

## EXPONENTIAL SERIES & LOGARITHMIC SERIES (APPENDIX-1)

### Solved Examples

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

A. e

B. 3e

C. 5e

D.  $e/5$

**Answer: C**



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$$2. 1 + \frac{2^3}{1!}x + \frac{3^3}{2!}x^2 + \dots =$$

A.  $(x^3 - 6x^2 + 7x - 1)e^x$

B.  $(x^2 + 7x + 8)e^x - 8$

C.  $(x^3 + 6x^2 + 7x + 1)e^x$

D.  $(x^2 + 7x + 8)e^x + 8$

**Answer: C**



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$$3. \text{If } y = \frac{1}{2x^2 - 1} \text{ then } y + \frac{y^3}{3} + \frac{y^5}{5} + \dots =$$

A.  $x + \frac{x^3}{3} + \frac{x^5}{5} + \dots$

B.  $2\left(x + \frac{x^3}{3} + \frac{x^5}{5} + \dots\right)$

$$C. \frac{1}{2} \left( x + \frac{x^3}{3} + \frac{x^5}{5} + \dots \right)$$

$$D. -\frac{1}{2} \left( x + \frac{x^3}{3} + \frac{x^5}{5} + \dots \right)$$

**Answer: B**



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$$4. \frac{x}{1.2} + \frac{x^2}{2.3} + \frac{x^3}{3.4} + \dots =$$

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

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

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

$$D. 1 + (x-1)/(x) \log(x-1)$$

**Answer: A**



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## Exercise 1 A

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

A.  $e$

B.  $e^2$

C.  $e^3$

D.  $1/e$

**Answer: B**



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$$2. 1 + \frac{4}{1!} + \frac{16}{2!} + \frac{64}{3!} + \dots =$$

A.  $e$

B.  $e^2$

C.  $e^3$

D.  $e^4$

**Answer: D**



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3.  $\sum_{k=1}^{\infty} \frac{1}{k!} \left( \sum_{n=1}^k 2^{n-1} \right) =$

A.  $e$

B.  $e^2 + e$

C.  $e^2$

D.  $e^2 - e$

**Answer: D**



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4.  $1 - \frac{2}{1!} + \frac{4}{2!} - \frac{8}{3!} + \dots =$

A.  $e$

B.  $e^2$

C.  $e^{-1}$

D.  $e^{-2}$

**Answer: D**



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$$5. 1 - \frac{3}{1!} + \frac{9}{2!} - \frac{27}{3!} + \dots =$$

A.  $e$

B.  $e^2$

C.  $e^3$

D.  $e^{-3}$

**Answer: D**



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$$6. \log_e 2 + \frac{(\log_e 2)^2}{2!} + \frac{(\log_e 2)^3}{3!} + \dots =$$

A. 1

B. 2

C. e

D.  $e^2$

**Answer: A**



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$$7. \log_e 3 + \frac{(\log_e 3)^2}{2!} + \frac{(\log_e 3)^3}{3!} + \dots =$$

A. 1

B. 2

C. e

D.  $e^2$

**Answer: B**



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$$8. 1 + 2(\log_e a) + \frac{2^2}{2!}(\log_e a)^2 + \frac{2^3}{3!}(\log_e a)^3 + \dots =$$

A.  $e$

B.  $a$

C.  $a^2$

D.  $e^2$

**Answer: C**



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$$9. 1 + x(\log_e 2) + \frac{x^2}{2!}(\log_e 2)^2 + \frac{x^3}{3!}(\log_e 2)^3 + \dots =$$



A.  $e^2$

B.  $x^2$

C.  $e^x$

D.  $2^x$

**Answer: D**

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10.  $x \log_e a + \frac{x^3}{3!} (\log_e a)^3 + \frac{x^5}{5!} (\log_e a)^5 + \dots =$

A.  $\cosh(x \log_e a)$

B.  $\coth(x \log_e a)$

C.  $\sinh(x \log_e a)$

D.  $\tanh(x \log_e a)$

**Answer: C**

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11.  $x \log_e a + \frac{x^3}{3!}(\log_e a)^3 + \frac{x^5}{5!}(\log_e a)^5 + \dots =$

A.  $\cosh (x \log_e a)$

B.  $\coth (x \log_e a)$

C.  $\sinh (x \log_e a)$

D.  $\tanh (x \log_e a)$

**Answer: C**



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12.  $\left(1 - \frac{3}{1!} + \frac{9}{2!} - \frac{27}{3!} + \dots\right) \left(1 + \frac{3}{1!} + \frac{9}{2!} + \frac{27}{3!} + \dots\right) =$

A.  $e$

B.  $e^2$

C.  $e^3$

D. 1

**Answer: D**



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$$13. \left( 1 - \frac{2}{1!} + \frac{4}{2!} - \frac{8}{3!} + \dots \right) \left( 1 + \frac{4}{1!} + \frac{16}{2!} + \frac{64}{3!} + \dots \right) =$$

A. e

B.  $e^2$

C.  $e^3$

D. 1

**Answer: B**



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$$14. e^{3x} =$$

A.  $1 + \frac{3}{1!} + \frac{3^2}{2!} + \frac{3^3}{3!} + \dots$

B.  $1 - \frac{3}{1!} + \frac{3^2}{2!} - \frac{3^3}{3!} + \dots$

C.  $1 + \frac{3x}{1!} + \frac{(3x)^2}{2!} + \frac{(3x)^3}{3!} + \dots$

D.  $1 - \frac{3x}{1!} + \frac{(3x)^2}{2!} - \frac{(3x)^3}{3!} + \dots$

**Answer: C**

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15.  $e^{-2x} =$

A.  $1 + \frac{2}{1!} + \frac{2^2}{2!} + \frac{2^3}{3!} + \dots$

B.  $1 - \frac{2}{1!} + \frac{2^2}{2!} - \frac{2^3}{3!} + \dots$

C.  $1 + \frac{2x}{1!} + \frac{(2x)^2}{2!} + \frac{(2x)^3}{3!} + \dots$

D.  $1 - \frac{2x}{1!} + \frac{(2x)^2}{2!} - \frac{(2x)^3}{3!} + \dots$

**Answer: D**

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16.  $e^{5x} + e^{-5x} =$

A.  $1 + \frac{5x}{1!} + \frac{(5x)^2}{2!} + \frac{(5x)^3}{3!} + \dots$

B.  $1 - \frac{5x}{1!} + \frac{(5x)^2}{2!} - \frac{(5x)^3}{3!} + \dots$

C.  $1 + \frac{(5x)^2}{2!} + \frac{(5x)^4}{3!} + \dots$

D.  $2 \left[ 1 + \frac{(5x)^2}{2!} + \frac{(5x)^4}{4!} + \dots \right]$

**Answer: D**



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17.  $e^{7x} - e^{-7x} =$

A.  $1 + \frac{7x}{1!} + \frac{(7x)^2}{2!} + \frac{(7x)^3}{3!} + \dots$

B.  $1 + \frac{(7x)^2}{2!} + \frac{(7x)^4}{3!} + \dots$

C.  $2 \left[ 1 + \frac{(7x)^2}{2!} + \frac{(7x)^4}{4!} + \dots \right]$

$$D. 2 \left[ \frac{7x}{1!} + \frac{(7x)^3}{3!} + \frac{(7x)^5}{5!} + \dots \right]$$

Answer: C

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$$18. \frac{e^{5x} + e^x}{e^{3x}} =$$

$$A. 2 \left[ 1 + \frac{(5x)^2}{2!} + \frac{(5x)^4}{4!} + \dots \right]$$

$$B. 2 \left[ 1 + \frac{(3x)^2}{2!} + \frac{(3x)^4}{4!} + \dots \right]$$

$$C. 2 \left[ 1 + \frac{(2x)^2}{2!} + \frac{(2x)^4}{4!} + \dots \right]$$

$$D. 2 \left[ 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots \right]$$

Answer: C

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$$19. \frac{e^{7x} - e^x}{e^{4x}} =$$

A.  $2 \left[ 1 + \frac{(3x)^2}{2!} + \frac{(3x)^4}{4!} + \dots \right]$

B.  $2 \left[ \frac{3x}{1!} + \frac{(3x)^3}{3!} + \dots \right]$

C.  $2 \left[ 1 + \frac{(2x)^2}{2!} + \frac{(2x)^4}{4!} + \dots \right]$

D.  $2 \left[ \frac{2x}{1!} + \frac{(2x)^3}{3!} + \dots \right]$

**Answer: B**

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**20.** The  $(n + 1)$  the term in the expansion of  $e^5$  is

A.  $5!$

B.  $5^n$

C.  $5^n / n$

D.  $5^n / n!$

**Answer: D**

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21. The  $(n + 1)$ th term in the expansion of  $e^{4x}$  is

A.  $4!$

B.  $4^n$

C.  $4^n/n!$

D.  $(4x)^n/n!$

**Answer: D**



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22. The 12th term in the expansion of  $e^{-3}$  is

A.  $\frac{3^{11}}{11!}$

B.  $\frac{-3^{11}}{11!}$

C.  $\frac{11!}{3^{11}}$



D.  $-\frac{11!}{3^{11}}$

**Answer: B**

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23. The  $(n + 1)$ th term in the expansion of  $e^{-2}$  is

A.  $\frac{3^n}{n!}$

B.  $\frac{(3x)^n}{n!}$

C.  $\frac{(-3x)^n}{n!}$

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

**Answer: D**

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24. The  $(n + 1)$ th term in the expansion of  $e^{-3x}$  is

A.  $\frac{3^n}{n!}$

B.  $\frac{(3x)^n}{n!}$

C.  $\frac{(-3x)^n}{n!}$

D.  $\frac{x^n}{n!}$

**Answer: C**



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**25.** The coefficient of  $x^8$  in the expansion of  $e^{3x}$  is

A.  $3^8$

B.  $\frac{3^8}{3!}$

C.  $\frac{3^8}{8!}$

D. none

**Answer: C**



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26. The coefficient of  $x^2$  in the expansion of  $e^{2x+3}$  is

A.  $e^2$

B.  $e^3$

C.  $2e^3$

D.  $3e^2$

**Answer: C**



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27. The coefficient of  $x^n$  in the expansion of  $(1 - x)e^x$  is

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

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

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

D.  $\frac{n-1}{n!}$

**Answer: C**



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**28.**

$$\frac{1}{e^{3x}}(e^x + e^{5x}) = a_0 + a_1x + a_2x^2 + \dots \Rightarrow 2a_1 + 2^3a_3 + 2^5a_5 + \dots$$

A. e

B.  $e^{-1}$

C. 1

D. 0

**Answer: D**



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

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

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

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

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

Answer: C



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

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

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

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

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

**Answer: B**



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**31.** The coefficient of  $x^n$  in the expansion of  $(2 + 3x)(e^{-3x})$  is

A.  $(-1)^n 2^n$

B.  $(-1)^n 2^n \left( \frac{3}{n!} - \frac{1}{(n-1)!} \right)$

C.  $(-1)^n 2^n \left( \frac{3}{n!} + \frac{1}{(n-1)!} \right)$

D.  $(-1)^n 3^n \left( \frac{2}{n!} - \frac{1}{(n-1)!} \right)$

**Answer: D**



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**32.** Coefficient of  $x^{10}$  in the expansion of  $(2 + 3x)e^{-x}$  is

A.  $\frac{-26}{(10)!}$

B.  $\frac{-28}{(10)!}$

C.  $\frac{-30}{(10)!}$

D.  $\frac{-32}{(10)!}$

**Answer: B**



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33. The coefficient of  $x^n$  in  $\frac{1 - 2x}{e^x}$  is

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

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

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

D.  $(-1)^n \cdot \frac{(1 + 4n)}{n!}$

**Answer: B**



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34. The coefficient of  $x^5$  in the expansion of  $\frac{1 - 2x + 3x^2}{e^x}$  is

A.  $\frac{71}{120}$

B.  $-\frac{71}{120}$

C.  $\frac{67}{120}$

D.  $-\frac{67}{120}$

**Answer: B**



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35. The coefficient of  $x^k$  in the expansion of  $\frac{1 - 2x - x^2}{e^{-x}}$  is

A.  $\frac{1 - k - k^2}{k!}$

B.  $\frac{k^2 + 1}{k!}$

C.  $\frac{1 - k}{k!}$

D.  $\frac{1}{k!}$



**Answer: A**



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36. The coefficient of  $x^n$  in  $\frac{1+x}{1!} + \frac{(1+x)^2}{2!} + \frac{(1+x)^3}{3!} + \dots$

A.  $e$

B.  $n!$

C.  $en!$

D.  $e/n!$

**Answer: D**



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37. The coefficient of  $x^n$  in

$$1 + (ax + b) + \frac{(ax + b)^2}{2!} + \frac{(ax + b)^3}{3!} + \dots$$

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

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

C.  $\frac{e^b a^n}{(n-1)!}$

D.  $\frac{e^a b^n}{(n-1)!}$

**Answer: A**



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38. The coefficient of  $x^n$  in the expansion of  $\sum_{n=1}^{\infty} (-1)^n \frac{(2+3x)^n}{n!}$  is

A.  $\frac{(-3)^n}{e^2 \cdot n!}$

B.  $\frac{(-2)^n}{e^3 \cdot n!}$

C.  $\frac{(-3)^n}{e^3 \cdot n!}$

D.  $\frac{(-2)^n}{e^2 \cdot n!}$

**Answer: A**



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39. If  $n$  is odd, coefficient of  $x^n$  in the expansion of

$$\left(1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots\right)^2 \text{ is}$$

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

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

C. 0

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

**Answer: C**



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40. If  $n$  is even, coefficient of  $x^n$  in the expansion of

$$\left(1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots\right)^2 \text{ is}$$

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

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

C. 0

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

**Answer: D**



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41.  $2 - \frac{3^2}{2!} + \frac{3^3}{3!} - \frac{3^4}{4!} + \dots =$

A.  $e^3$

B.  $e^{-3}$

C.  $-e^3$

D.  $-e^{-3}$

**Answer: D**



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42.  $\frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots =$

A.  $e$

B.  $e/2$

C.  $e^{-1}$

D.  $e-2$

**Answer: D**



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43.  $\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} + \dots =$

A.  $e$

B.  $e/2$

C.  $e^{-1}$

D.  $e - 2$

Answer: C



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44.  $-1 + \frac{2^2}{2!} - \frac{2^3}{3!} + \frac{2^4}{4!} - \dots =$

A.  $e$

B.  $e/2$

C.  $e^{-1}$

D.  $e^{-2}$

Answer: D



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45. Sum of the series  $1 + \frac{3^2}{2!} + \frac{3^4}{4!} + \frac{3^6}{6!} + \dots$  to  $\infty$  is

A.  $e^{-3}$

B.  $e^3$

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

D.  $\frac{1}{2}(e^3 + e^{-3})$

**Answer: D**

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46.  $\sum_{n=0}^{\infty} \frac{1}{(n+1)!} =$

A.  $e$

B.  $e + 1$

C.  $1 - e$

D.  $e - 1$

**Answer: D**

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$$47. \sum_{n=1}^{\infty} \frac{1}{(2n-1)!} =$$

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

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

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

D.  $e - e^{-1}$

**Answer: B**



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$$48. \sum_{n=1}^{\infty} \frac{x^n}{(2n-1)!} =$$

A.  $e^{\sqrt{x}} - e^{-\sqrt{x}}$

B.  $\sqrt{x}(e^{\sqrt{x}} - e^{-\sqrt{x}})$

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

D.  $\sqrt{x}(e^{\sqrt{x}} - e^{-\sqrt{x}}) / 2$



**Answer: D**

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49. The sum of series  $\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots$  is

A.  $\frac{(e^2 - 1)}{2}$

B.  $\frac{(e^2 - 2)}{e}$

C.  $\frac{(e^2 - 1)}{2e}$

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

**Answer: D**

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50.  $1 + \frac{1}{3!} + \frac{1}{5!} + \dots =$

A. e

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

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

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

**Answer: D**



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

A.  $e$

B.  $e^2$

C.  $2e$

D.  $1/e$

**Answer: A**



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52.  $\frac{3}{2!} + \frac{5}{4!} + \frac{7}{6!} + \frac{9}{8!} + \dots =$

A.  $e$

B.  $2e$

C.  $e^{-1}$

D.  $e - 1$

**Answer: D**

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53.  $2 \left[ 1 + \frac{(\log_e a)^2}{2!} + \frac{(\log_e a)^4}{4!} + \dots \right] =$

A.  $a$

B.  $a + a^{-1}$

C.  $a^2 + a^{-2}$

D.  $a - a^{-1}$

**Answer: B**



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54.  $1 + \frac{2}{3!} + \frac{3}{5!} + \frac{4}{7!} + \dots =$

A.  $e$

B.  $e/2$

C.  $e^{-1}$

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

**Answer: B**



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55.  $\frac{2}{3!} + \frac{4}{5!} + \frac{6}{7!} + \dots =$

A.  $e$

B.  $e/2$

C.  $e^{-1}$

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

**Answer: C**



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56.  $\frac{1}{3!} + \frac{2}{5!} + \frac{3}{7!} + \dots =$

A.  $e$

B.  $e/2$

C.  $e^{-1}$

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

**Answer: D**



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$$57. 1 + \frac{2}{1!} + \frac{3}{2!} + \frac{4}{3!} + \dots =$$

A.  $e$

B.  $2e$

C.  $e^{-1}$

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

**Answer: B**



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$$58. 1 + \frac{3}{1!} + \frac{5}{2!} + \frac{7}{3!} + \dots =$$

A.  $e$

B.  $2e$

C.  $3e$

D.  $e + 2$

**Answer: C**



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59.  $\frac{3}{2!} + \frac{5}{3!} + \frac{7}{4!} + \frac{9}{5!} + \dots =$

A.  $e$

B.  $2e$

C.  $e^{-1}$

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

**Answer: A**



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60.  $1 + \frac{4}{2!} + \frac{7}{3!} + \frac{10}{4!} + \dots =$

A.  $e$

B.  $2e$

C.  $3e$

D.  $e + 2$

**Answer: D**

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61.  $\sum_{n=1}^{\infty} \frac{2n}{(2n+1)!} =$

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

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

C.  $e$

D.  $2e$

**Answer: A**

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62.  $\sum_{n=1}^{\infty} \frac{n^2}{(n+1)!} =$

A.  $e$

B.  $2e$

C.  $3e$

D.  $e - 1$

**Answer: D**



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63.  $\sum_{n=1}^{\infty} (2n^2 + n + 1)/(n!) =$

A.  $2e - 1$

B.  $2e + 1$

C.  $6e - 1$

D.  $6e + 1$

Answer: C



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$$64. \left(1 + \frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots\right)^2 - \left(1 + \frac{1}{3!} + \frac{1}{5!} + \frac{1}{7!} + \dots\right)^2 =$$

A. 0

B. 1

C. e

D.  $1/e$

Answer: B



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$$65. \left(1 + \frac{a^2x^2}{2!} + \frac{a^4x^4}{4!} + \dots\right)^2 - \left(ax + \frac{a^3x^3}{3!} + \frac{a^5x^5}{5!} + \dots\right)^2 =$$

A. 0

B. 1

C.  $e$

D.  $1/e$

**Answer: B**



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$$66. \frac{1 + \frac{2^2}{2!} + \frac{2^4}{3!} + \frac{2^6}{4!} + \dots}{1 + \frac{1}{2!} + \frac{2}{3!} + \frac{2^2}{4!} + \dots} =$$

A.  $e - 1$

B.  $e^2 - 1$

C.  $e + 1$

D.  $e^2 + 1$

**Answer: B**



**Watch Video Solution**

$$67. \frac{1 + \frac{1}{3!} + \frac{1}{5!} + \dots}{1 + \frac{1}{2!} + \frac{1}{4!} + \dots} =$$

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

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

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

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

**Answer: B**



**Watch Video Solution**

$$68. \frac{\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots}{1 + \frac{1}{3!} + \frac{1}{5!} + \dots} =$$

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

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

C.  $e^{-1}$

D.  $\frac{e^{-1}}{2}$

**Answer: A**



**Watch Video Solution**

$$69. \frac{1}{2} - \frac{1}{3(1!)} + \frac{1}{4(2!)} - \frac{1}{5(3!)} + \dots =$$

A.  $e$

B.  $2/e$

C.  $1 - 1/e$

D.  $1 - 2/e$

**Answer: D**



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$$70. \frac{1}{1!} + \frac{1+2}{2!} + \frac{1+2+2^2}{3!} + \dots =$$

A.  $e$

B.  $e^2$

C.  $e^2 + e$

D.  $e^2 - e$

**Answer: D**



**Watch Video Solution**

71.  $\frac{1}{1!} + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \dots =$

A.  $e^3 - e$

B.  $\frac{1}{4}(e^3 - e)$

C.  $\frac{1}{3}(e^3 - e)$

D.  $\frac{1}{2}(e^3 - e)$

**Answer: D**



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72.  $\frac{1}{2!} + \frac{1+2}{3!} + \frac{1+2+3}{4!} + \dots$

A.  $e$

B.  $2e$

C.  $e/2$

D.  $1/e$

**Answer: C**



**Watch Video Solution**

73.  $\frac{2}{2!} + \frac{2+4}{3!} + \frac{2+4+6}{4!} + \dots =$

A.  $e - 2$

B.  $e - 1$

C.  $e$

D.  $e^{-1}$

Answer: C

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74.  $\frac{1}{1!} + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \dots =$

A. e

B. 2e

C.  $e/2$

D.  $1/e$

Answer: B

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75.  $1^2 + \frac{2^2}{2!} + \frac{3^2}{3!} + \frac{4^2}{4!} + \dots =$

A. e



B.  $2e$

C.  $e/2$

D.  $1/e$

**Answer: B**

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76.  $\frac{1^2}{2!} + \frac{2^2}{3!} + \frac{3^2}{4!} + \dots =$

A.  $e$

B.  $2e$

C.  $e - 1$

D.  $e + 1$

**Answer: C**

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$$77. \frac{1^2}{1!} + \frac{1^2 + 2^2}{2!} + \frac{1^2 + 2^2 + 3^2}{3!} + \dots =$$

A.  $17e/6$

B.  $6e/17$

C.  $11e/7$

D.  $7e/11$

**Answer: A**



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$$78. \frac{1^2 \cdot 2}{1!} + \frac{2^2 \cdot 3}{2!} + \frac{3^2 \cdot 4}{3!} + \dots =$$

A.  $5e$

B.  $7e$

C.  $11e$

D.  $e/5$

Answer: B



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$$79. \frac{1^2 \cdot 2^2}{1!} + \frac{2^2 \cdot 3^2}{2!} + \frac{3^2 \cdot 4^2}{3!} + \dots =$$

A.  $27e$

B.  $6e - 1$

C.  $7e$

D.  $2e$

Answer: A



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$$80. \sum_{n=1}^{\infty} {}^n C_0 + {}^n C_1 + {}^n C_2 + \dots + {}^n C_n =$$

A.  $e - 1$

B.  $e + 1$

C.  $e^2 - 1$

D.  $e^2 + 1$

**Answer: C**

 [View Text Solution](#)

81.  $1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots =$

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

B.  $\frac{e^x - e^{-x}}{2}$

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

D.  $\frac{e^{ix} - e^{-ix}}{2}$

**Answer: C**

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82.  $\frac{1.2}{1!} + \frac{2.3}{2!} + \frac{3.4}{3!} + \dots =$

A.  $e$

B.  $2e$

C.  $3e$

D.  $e + 2$

**Answer: C**



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83.  $1 + \frac{1}{2!} + \frac{1.3}{4!} + \frac{1.3.5}{6!} + \dots =$

A.  $e$

B.  $2e$

C.  $1/e$

D.  $\sqrt{e}$

Answer: D



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84. If  $S = \frac{1}{1.2} + \frac{1.3}{1.2.3.4} + \frac{1.3.5}{1.2.3.4.5.6} + \dots$  to  $\infty$ , then  $S =$

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

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

C.  $e + 1$

D. none of these

Answer: A



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85.  $\frac{4}{1!} + \frac{11}{2!} + \frac{22}{3!} + \frac{37}{4!} + \frac{56}{5!} + \dots =$

A.  $27e$

B.  $6e - 1$

C.  $7e$

D.  $2e$

**Answer: B**

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86.  $\frac{5}{1!} + \frac{7}{3!} + \frac{9}{5!} + \dots =$

A.  $5e - 3e^{-1}$

B.  $\frac{5e - 3e^{-1}}{2}$

C.  $5e - 3e^{-1}$

D.  $\frac{5e - 3e^{-1}}{2}$

**Answer: B**

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

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

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

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

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

**Answer: D**



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88.  $1 + \frac{2x}{1!} + \frac{3x^2}{2!} + \frac{4x^2}{3!} + \dots =$

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

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

C.  $xe^x$

D.  $e^x$



**Answer: A**



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$$89. 1.2 + \frac{2.3}{1!}x + \frac{3.4}{2!}x^2 + \dots =$$

A.  $(x^2 + 4x + 2)e^x$

B.  $(x^2 + 3x + 2)e^x$

C.  $(x^2 - 4x + 2)e^x$

D.  $(x^2 - 3x + 2)e^x$

**Answer: A**



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$$90. \frac{3.5}{1!}x + \frac{4.6}{2!}x^2 + \frac{5.7}{3!}x^3 + \dots =$$

A.  $(x^3 - 6x^2 + 7x - 1)e^x$

B.  $(x^2 + 7x + 8)e^x - 8$

C.  $(x^3 + 6x^2 + 7x + 1)e^x$

D.  $(x^2 + 7x + 8)e^x + 8$

**Answer: B**



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**91.**

**If**

$$S = (x + y)(x - y) + \frac{1}{2!}(x + y)(x - y)(x^2 + y^2) + \frac{1}{3!}(x + y)(x - y)(x^3 + y^3) + \dots$$

then S =

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

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

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

D. none of these

**Answer: C**



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92. The approximate value of  $e^2$  is

A. 7.2

B. 7.3

C. 7.4

D. 7.5

Answer: C



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93.  $x + \frac{x^2}{3!} + \frac{x^3}{5!} + \dots =$

A.  $2\sqrt{x}(e^{\sqrt{x}} + e^{\sqrt{x}})$

B.  $\sqrt{x}(e^{\sqrt{x}} - e^{\sqrt{x}}) / 2$

C.  $\sqrt{x}(e^{\sqrt{x}} + e^{\sqrt{x}})$

D.  $\sqrt{x}(e^{\sqrt{x}} - e^{\sqrt{x}})$

**Answer: B**



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### Exercise 1 B

1. The 7th term of  $\log_e(5/4)$  is

A.  $\frac{1}{7.4^7}$

B.  $-\frac{1}{7.4^7}$

C.  $\frac{1}{7}$

D.  $-\frac{1}{7}$

**Answer: A**



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2. The  $n$ th term of  $\log_e 2$  is

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

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

C.  $\frac{(-1)^{n-1}}{n \cdot 3^n}$

D.  $\frac{(-1)^{n-1}}{n \cdot 4^n}$

**Answer: B**



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3. The  $n$ th term of  $\log_2(3/2)$  is

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

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

C.  $\frac{(-1)^{n-1}}{n \cdot 3^n}$

D.  $\frac{(-1)^{n-1}}{n \cdot 4^n}$

**Answer: A**



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4. The  $n$ th term of  $\log_e(4/3)$  is

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

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

C.  $\frac{(-1)^{n-1}}{n \cdot 3^n}$

D.  $\frac{(-1)^{n-1}}{n \cdot 4^n}$

**Answer: C**



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5.  $\frac{3}{4} + \frac{1}{3} \left(\frac{3}{4}\right)^3 + \frac{1}{5} \left(\frac{3}{4}\right)^5 + \dots =$

A.  $\log_e 3$

B.  $\log_e 4$

C.  $\log_e 7$

D.  $\frac{1}{2}\log_e 7$

**Answer: D**

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$$6. 2 \left[ \left( \frac{1}{3} \right) + \frac{1}{3} \left( \frac{1}{3} \right)^3 + \frac{1}{5} \left( \frac{1}{3} \right)^5 + \dots \right] =$$

A.  $\log_e 3$

B.  $\log_e 4$

C.  $\log_e 2$

D.  $\log_e 5$

**Answer: C**

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$$7.2 \left[ \left( \frac{1}{2} \right) + \frac{1}{3} \left( \frac{1}{2} \right)^3 + \frac{1}{5} \left( \frac{1}{2} \right)^5 + \dots \right] =$$

A.  $\log_e 3$

B.  $\log_e 4$

C.  $\log_e 2$

D.  $\log_e 5$

**Answer: A**



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$$8.2 \left[ \left( \frac{2}{3} \right) + \frac{1}{3} \left( \frac{2}{3} \right)^3 + \frac{1}{5} \left( \frac{2}{3} \right)^5 + \dots \right] =$$

A.  $\log_e 3$

B.  $\log_e 4$

C.  $\log_e 2$

D.  $\log_e 5$



**Answer: D**



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$$9. \frac{1}{3} + \frac{1}{3 \cdot 3^3} + \frac{1}{5 \cdot 3^5} + \frac{1}{7 \cdot 3^7} + \dots =$$

A.  $\log 2$

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

C.  $2 \log 2$

D.  $\log (1/2)$

**Answer: B**



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$$10. \frac{1}{5} + \frac{1}{3 \cdot 5^3} + \frac{1}{5 \cdot 5^5} + \frac{1}{7 \cdot 5^7} + \dots =$$

A.  $\log (3/2)$

B.  $\frac{1}{2}\log(3/2)$

C.  $2\log(3/2)$

D.  $\log(2/3)$

**Answer: B**

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11.  $1 + \frac{1}{3 \cdot 2^2} + \frac{1}{5 \cdot 2^4} + \frac{1}{7 \cdot 2^6} + \dots =$

A.  $\log_e 2$

B.  $\log_e 3$

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

D.  $\frac{1}{2}\log_e 3$

**Answer: B**

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12.  $\log_4 2 - \log_8 2 + \log_{16} 2 - \dots =$

A.  $e^2$

B.  $\log_2$

C.  $+\log_e 3$

D.  $1 - \log_e 2$

**Answer: D**



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13.  $\log_e 2 =$

A.  $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots$

B.  $1 - \frac{1}{2} - \frac{1}{3} - \frac{1}{4} - \dots$

C.  $\frac{1}{1.2} + \frac{1}{3.4} + \frac{1}{5.6} + \dots$

D.  $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots$

**Answer: C**



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14.  $\frac{1}{1.2} + \frac{1}{3.4} + \frac{1}{5.6} + \dots$

A.  $\log_e 2$

B.  $\log_e 3$

C.  $\log_e 5$

D.  $\log_e 2 - 1/2$

**Answer: A**



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15.  $\frac{1}{2.3} + \frac{1}{4.5} + \frac{1}{6.7} + \frac{1}{8.9} + \dots$

A.  $\log\left(\frac{2}{e}\right)$

B.  $\log\left(\frac{e}{2}\right)$

C.  $\log(2e)$

D.  $e - 1$

**Answer: B**



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16.  $\frac{1}{1.2} - \frac{1}{2.3} + \frac{1}{3.4} - \frac{1}{4.5} + \dots =$

A.  $\log_e 2 - 1$

B.  $2\log_e 2 - 1$

C.  $2\log_e 2$

D.  $2\log_e 2 + 1$

**Answer: B**



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17.  $\frac{1}{1.3} + \frac{1}{2.5} + \frac{1}{3.7} + \frac{1}{4.9} + \dots =$

A.  $2 \log_e 2.2$

B.  $2 - 2 \log_e 2$

C.  $2 \log_e 4$

D.  $\log_e 4$

**Answer: B**



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18.  $\frac{1}{1.2.3} + \frac{1}{3.4.5} + \frac{1}{5.6.7} + \dots$

A.  $\log_e 2$

B.  $\log_e 3$

C.  $\log_e 5$

D.  $\log_e 2 - 1/2$

**Answer: D**



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19.  $\frac{5}{1.2.3} + \frac{7}{3.4.5} + \frac{9}{5.6.7} + \dots =$

A.  $\log_e \left( \frac{8}{e} \right)$

B.  $\log_e \left( \frac{2}{e} \right)$

C.  $\log_e \left( \frac{6}{5} \right)$

D.  $2 - \log_e 2$

**Answer: A**



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20. The sum of the series  $\frac{1}{1.3.5} + \frac{1}{3.5.7} + \frac{1}{5.7.9} + \dots$  is

A.  $3 \log_e x$

B.  $1/8$

C.  $1/9$

D.  $1/12$

**Answer: D**



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21. Sum of the series  $\frac{1}{4.5.6} + \frac{1}{5.6.7} + \frac{1}{6.7.8} + \dots$  upto  $\infty$  is

A.  $\frac{1}{20} \log_e e$

B.  $\frac{1}{10} \log_e e$

C.  $\frac{1}{40} \log_e e$

D. none of these

**Answer: C**



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$$22. \frac{1}{1.3} + \frac{1}{2} \left( \frac{1}{3.5} \right) + \frac{1}{3} \left( \frac{1}{5.7} \right) + \dots =$$

A.  $\log_e \left( \frac{8}{e} \right)$

B.  $\log_e \left( \frac{2}{e} \right)$

C.  $\log_e \left( \frac{6}{5} \right)$

D.  $2 - \log_e 2$

**Answer: B**



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$$23. \frac{2}{3} + \frac{1}{2} \left( \frac{2}{3} \right)^2 + \frac{1}{3} \left( \frac{2}{3} \right)^3 + \dots =$$

A.  $\log_e 2$

B.  $\log_e 3$

C.  $\log_e 5$

D.  $\log_e (3/2)$

**Answer: B**



**Watch Video Solution**

24.  $\frac{1}{5} + \frac{1}{2.5^2} + \frac{1}{3.5^3} + \frac{1}{4.5^4} + \dots =$

A.  $\log_e \left( \frac{8}{e} \right)$

B.  $\log_e \left( \frac{2}{e} \right)$

C.  $\log_e \left( \frac{5}{4} \right)$

D.  $2 - \log_e 2$

**Answer: C**



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25. The sum of the series  $\frac{1}{2} \left( \frac{1}{5} \right)^2 + \frac{2}{3} \left( \frac{1}{5} \right)^3 + \frac{3}{4} \left( \frac{1}{5} \right)^4 + \dots$  is

A.  $\frac{1}{4} + \log_e \left( \frac{4}{5} \right)$

B.  $\frac{1}{3} + \log_e \left( \frac{2}{3} \right)$

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

D. none of these

**Answer: A**



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26.  $\frac{1}{2} - \frac{1}{2} \cdot \frac{1}{2^2} + \frac{1}{3} \cdot \frac{1}{2^3} - \frac{1}{4} \cdot \frac{1}{2^4} + \dots =$

A.  $\log_e 2$

B.  $\log_e 3$

C.  $\log_e 5$

D.  $\log_e (3/2)$

**Answer: D**



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$$27. \frac{1}{2} + \frac{3}{2} \cdot \frac{1}{4} + \frac{5}{3} \cdot \frac{1}{8} + \frac{7}{4} \cdot \frac{1}{16} + \dots =$$

A.  $\log_e \left( \frac{8}{e} \right)$

B.  $\log_e \left( \frac{2}{e} \right)$

C.  $\log_e \left( \frac{6}{5} \right)$

D.  $2 - \log_e 2$

**Answer: D**



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28. Sum of the series

$$\frac{1}{2} \left( \frac{1}{2} + \frac{1}{3} \right) - \frac{1}{4} \left( \frac{1}{2^2} + \frac{1}{3^2} \right) + \frac{1}{6} \left( \frac{1}{2^3} + \frac{1}{3^3} \right) - \dots \text{ is}$$

A.  $\log_e 3$

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

C.  $\log_e \cdot \frac{3}{2}$

D.  $\log_e \cdot \frac{2}{3}$

**Answer: B**



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$$29. \frac{a-b}{a} + \frac{1}{2} \left( \frac{a-b}{a} \right)^2 + \frac{1}{3} \left( \frac{a-b}{a} \right)^3 + \dots =$$

A.  $\log_e(a/b)$

B.  $\log_e(b/a)$

C.  $\log_e(a+b)$

D.  $\log_e(a-b)$

**Answer: A**



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$$30. (a-1) - \frac{1}{2}(a-1)^2 + \frac{1}{3}(a-1)^3 - \frac{1}{4}(a-1)^4 + \dots =$$

A.  $\log a$

B.  $\log(a - 1)$

C.  $\log(1 + a)$

D.  $\log(1 - a)$

**Answer: A**



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

A.  $\log(x - 1)$

B.  $\log x$

C.  $x$

D. none of these

**Answer: C**



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32. If  $S = \frac{(b-1) - \frac{1}{2}(b-1)^2 + \frac{1}{3}(b-1)^3 - \dots}{(a-1) - \frac{1}{2}(a-1)^2 + \frac{1}{3}(a-1)^3 - \dots}$ , then  $S =$

A.  $\log_e b$

B.  $\log_a b$

C.  $\log_e a$

D.  $\log_b a$

**Answer: B**



**Watch Video Solution**

33.  $\frac{1}{x+1} + \frac{1}{2(x+1)^2} + \frac{1}{3(x+1)^3} + \dots =$

A.  $\log \left[ \frac{x}{x+1} \right]$

B.  $\log \left[ \frac{x+1}{x} \right]$

C.  $\log \left[ \frac{x+1}{x-1} \right]$

D.  $\log \left[ \frac{x-1}{x+1} \right]$

**Answer: B**



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$$34. \frac{x}{x+1} + \frac{1}{2} \left( \frac{x}{x+1} \right)^2 + \frac{1}{3} \left( \frac{x}{x+1} \right)^3 + \dots =$$

A.  $\log(1+x)$

B.  $\log(1-x)$

C.  $\log x$

D. none

**Answer: A**



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$$35. \frac{2ax}{a^2+x^2} + \frac{1}{3} \left( \frac{2ax}{a^2+x^2} \right)^3 + \frac{1}{5} \left( \frac{2ax}{a^2+x^2} \right)^5 + \dots =$$

A.  $\log. \frac{a+x}{a-x}$



B.  $\log. \frac{a - x}{a + x}$

C.  $\log. \frac{x + a}{x - a}$

D.  $\log. \frac{x - a}{x + a}$

**Answer: A**



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36.  $\left(\frac{2n}{n^2 + 1}\right) + \frac{1}{3}\left(\frac{2n}{n^2 + 1}\right)^3 + \frac{1}{5}\left(\frac{2n}{n^2 + 1}\right)^5 + \dots =$

A.  $\log. \frac{n + 1}{n - 1}$

B.  $\log. \frac{n - 1}{n + 1}$

C.  $\log. \frac{1 + n}{1 - n}$

D.  $\log. \frac{1 - n}{1 + n}$

**Answer: A**



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$$37. \frac{1}{2x-1} + \frac{1}{3} \cdot \frac{1}{(2x-1)^3} + \frac{1}{5} \frac{1}{(2x-1)^5} + \dots =$$

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

B.  $\frac{1}{2} \log. \frac{x-1}{x}$

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

D.  $\frac{1}{2} \log. \frac{1-x}{2}$

**Answer: A**



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$$38. \frac{1}{2x+1} + \frac{1}{3} \frac{1}{(2x+1)^3} + \frac{1}{5} \frac{1}{(2x+1)^5} + \dots =$$

A.  $\frac{1}{2} \log. \frac{x}{x+1}$

B.  $\log. \frac{x}{x+1}$

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

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

**Answer: D**

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$$39. \frac{1}{2n^2 - 1} + \frac{1}{3(2n^2 - 1)^3} + \frac{1}{5(2n^2 - 1)^5} + \dots =$$

A.  $\log. \frac{n^2}{n^2 - 1}$

B.  $\frac{1}{2} \log. \frac{n^2}{n^2 - 1}$

C.  $\log. \frac{n^2 - 1}{n^2}$

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

**Answer: B**

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$$40. \text{If } x > 0 \text{ then } \frac{x - 1}{x + 1} + \frac{1}{2} \frac{x^2 - 1}{(x + 1)^2} + \frac{1}{3} \frac{x^3 - 1}{(x + 1)^3} + \dots =$$

A.  $\log(1 + x)$

B.  $\log(1 - x)$

C.  $\log(x - 1)$

D.  $\log x$

**Answer: D**

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41.  $\log(1 + x + x^2 + \dots \infty) =$

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

B.  $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} \dots \infty$

C.  $1 + x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \dots \infty$

D.  $1 - x + \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{4} + \dots \infty$

**Answer: A**

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42. If  $|x| < 1$  then  $\frac{1}{2}x^2 + \frac{2}{3}x^3 + \frac{3}{4}x^4 + \dots =$

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

**Answer: A**



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43.  $\frac{a-1}{a+1} + \frac{1}{3} \left( \frac{a-1}{a+1} \right)^3 + \frac{1}{5} \left( \frac{a-1}{a+1} \right)^5 + \dots =$

A.  $\log a$

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

C.  $2 \log a$

D.  $\log(1/a)$

Answer: B



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44. If  $|x| < 1$  and  $y = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$ , then  $x =$

A.  $y + \frac{y^2}{2} + \frac{y^3}{3} + \dots$

B.  $y - \frac{y^2}{2} + \frac{y^3}{3} - \frac{y^4}{4} + \dots$

C.  $y + \frac{y^2}{2!} + \frac{y^3}{3!} + \dots$

D.  $y - \frac{y^2}{2!} + \frac{y^3}{3!} - \frac{y^4}{4!} + \dots$

Answer: C



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45. If  $y = x + \frac{x^2}{2} + \frac{x^3}{3} + \dots \infty$ , then  $x =$

A.  $y - \frac{y^2}{2!} + \frac{y^3}{3!} - \frac{y^4}{4!} + \dots$

$$B. y + \frac{y^2}{2!} + \frac{y^3}{3!} + \frac{y^4}{4!} +$$

$$C. 1 - y + \frac{y^2}{2!} - \frac{y^3}{3!} + \frac{y^4}{4!} - \dots$$

$$D. 1 + y + \frac{y^2}{2!} + \frac{y^3}{3!} + \frac{y^4}{4!} + \dots$$

**Answer: A**



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$$46. |a| < 1, b = \sum_{k=1}^{\infty} \frac{a^k}{k} \Rightarrow a =$$

$$A. \sum_{k=1}^{\infty} \frac{(-1)^k b^k}{k}$$

$$B. \sum_{k=1}^{\infty} \frac{(-1)^{k-1} b^k}{k!}$$

$$C. \sum_{k=1}^{\infty} \frac{(-1)^k b^k}{(k-1)!}$$

$$D. \sum_{k=1}^{\infty} \frac{(-1)^{k-1} b^k}{(k+1)!}$$

**Answer: B**



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47. If  $y = \frac{1}{2x^2 - 1}$  then  $y + \frac{y^3}{3} + \frac{y^5}{5} + \dots =$

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

B.  $2\left(\frac{1}{x^2} + \frac{1}{2x^4} + \frac{1}{3x^6} + \dots\right)$

C.  $\frac{1}{2}\left(\frac{1}{x^2} + \frac{1}{2x^4} + \frac{1}{3x^6} + \dots\right)$

D.  $-\left(\frac{1}{x^2} + \frac{1}{2x^4} + \frac{1}{3x^6} + \dots\right)$

**Answer: C**



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48.  $\frac{1}{x^2} + \frac{1}{2x^4} + \frac{1}{3x^6} + \dots =$

A.  $2 \log x - \log(x + 1) - \log(x - 1)$

B.  $\log(x + 1) + \log(x - 1) - 2 \log x$

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

D.  $2 \log x - \log(x + 1) + \log(x - 1)$



Answer: A



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$$49. \frac{1}{1.3} \cdot \frac{1}{2} + \frac{1}{2.4} \cdot \frac{1}{2^2} + \frac{1}{3.5} \cdot \frac{1}{2^3} + \dots =$$

A.  $\frac{5}{4} + \frac{3}{2} \log \frac{1}{2}$

B.  $\frac{4}{4} + \frac{3}{2} \log 2$

C.  $\frac{4}{5} + \frac{3}{2} \log 2$

D.  $\frac{4}{5} + \frac{2}{3} \log \left( \frac{1}{2} \right)$

Answer: A



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$$50. 3x - \frac{5x^2}{2} + \frac{9x^3}{3} - \frac{17x^4}{4} + \dots + (-1)^{n-1} \frac{(2^n + 1)}{2} x^n + \dots =$$

A.  $\log(1 + 4x + 3x^2)$

B.  $\log_e(1 + 3x + 2x^2)$

C.  $\log(1 + 5x + 6x^2)$

D.  $\log_e(1 + 6x + 5x^2)$

**Answer: B**

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51.  $5x - \frac{13}{2}x^2 + \frac{35}{3}x^3 - \frac{97}{4}x^4 + \dots =$

A.  $\log(1 + 4x + 3x^2)$

B.  $(1 + 3x + 2x^2)$

C.  $\log(1 + 5x + 6x^2)$

D.  $(1 + 6x + 5x^2)$

**Answer: C**

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52. The coefficient of  $x^n$  in the expansion of  $\log_e (1 + 3x + 2x^2)$  is

A.  $(-1)^{n-1}(1 + 2^n) / n$

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

C.  $(-1)^{n-1}2^n / n$

D.  $(-1)^n(2^n - 1) / n$

**Answer: A**



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53. The coefficient of  $x^n$  in the expansion of  $\log (1 - 5x + 6x)^2$  is

A.  $\frac{2^n + 3^n}{n}$

B.  $\frac{2^n - 3^n}{n}$

C.  $\frac{3^n - 2^n}{2}$

D.  $\frac{-3^n - 2^n}{n}$

**Answer: D**



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54. If  $n = 3m$  then the coefficient of  $x^n$  in the expansion of  $\log(1 + x + x^2)$  is

A.  $n$

B.  $1/n$

C.  $2/n$

D.  $-2/n$

**Answer: B**



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55. If  $n = 3m$  then the coefficient of  $x^n$  in the expansion of  $\log(1 + x + x^2)$  is

A.  $n$

B.  $1/n$

C.  $2/n$

D.  $-2/n$

**Answer: D**

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56. The expansion of  $\log. \frac{1+x+x^2}{1-x+x^2}$  as ascending powers of  $x$  is

A.  $x - \frac{2}{3}x^3 + \frac{x^5}{5} + \frac{x^7}{7} - \frac{2}{9}x^9 \dots$

B.  $x + \frac{2}{3}x^3 + \frac{x^5}{5} + \frac{x^7}{7} + \frac{2}{9}x^9 \dots$

C.  $2 \left[ x - \frac{2}{3}x^3 + \frac{x^5}{5} + \frac{x^7}{7} - \frac{2}{9}x^9 \dots \right]$

D.  $2 \left[ x + \frac{2}{3}x^3 + \frac{x^5}{5} + \frac{x^7}{7} + \frac{2}{9}x^9 \dots \right]$

**Answer: C**

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57. If  $|x| < 1$ , the coefficient of  $x^3$  in the expansion of  $\log(1 + x + x^2)$  in ascending power of  $x$ , is

A.  $2/3$

B.  $4/3$

C.  $-2/3$

D.  $-4/3$

**Answer: C**



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58. If  $x$  is very small and neglecting  $x^3$  and higher powers of  $x$  then the expansion of  $\log(1 + x^2) - \log(1 + x) - \log(1 - x)$  as ascending powers of  $x$  is

A.  $2x$

B.  $2x^2$

C.  $1 + 2x$

D.  $1 - x^2$

**Answer: B**



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59.  $\frac{x}{1.2} + \frac{x^2}{3.4} + \frac{x^3}{5.6} + \dots =$

A.  $\frac{\sqrt{x}}{2} \log. \frac{1 + \sqrt{x}}{1 - \sqrt{x}} + \frac{1}{2} \log(1 - x)$

B.  $\frac{\sqrt{x}}{2} \log. \frac{1 - \sqrt{x}}{1 + \sqrt{x}} + \log(1 - x)$

C.  $\frac{\sqrt{x}}{2} \log. \frac{1 + \sqrt{x}}{1 - \sqrt{x}} + \log(x - 1)$

D.  $\frac{\sqrt{x}}{2} \log. \frac{1 - \sqrt{x}}{1 + \sqrt{x}} + \log(x - 1)$

**Answer: A**



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$$60. \sum_{n=1}^{\infty} \frac{x^n}{n+2} =$$

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

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

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

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

**Answer: C**

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$$61. \sum_{n=1}^{\infty} \frac{x^{n+1/2}}{n+1} =$$

A.  $\frac{1}{\sqrt{x}} [x + \log(1-x)]$

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

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

D.  $-\frac{1}{x} [x + \log(1-x)]$



**Answer: B**



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62.  $\sin^2 \theta + \frac{1}{2}\sin^4 \theta + \frac{1}{3}\sin^6 \theta + \dots =$

A.  $2 \log \sin \theta$

B.  $2 \log \cos \theta$

C.  $2 \log \sec \theta$

D.  $2 \log \cos e\theta$

**Answer: C**



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63.  $\cos^2 \theta + \frac{1}{2}\cos^4 \theta + \frac{1}{3}\cos^6 \theta + \dots =$

A.  $2 \log \sin \theta$

B.  $2 \log \cos \theta$

C.  $2 \log \sec \theta$

D.  $2 \log \cos e\theta$

**Answer: D**



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64.  $\tan^2 \theta - \frac{1}{2} \tan^4 \theta + \frac{1}{3} \tan^6 \theta - \frac{1}{4} \tan^8 \theta + \dots =$

A.  $2 \log \sin \theta$

B.  $2 \log \cos \theta$

C.  $2 \log \sec \theta$

D.  $2 \log \cos e\theta$

**Answer: C**



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65.  $\cos \theta + \frac{1}{3}\cos^3 \theta + \frac{1}{5}\cos^5 \theta + \dots =$

A.  $\log \tan \theta$

B.  $\log \cot \theta$

C.  $\log \tan(\theta/2)$

D.  $\log \cot(\theta/2)$

**Answer: D**



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66.  $\sin 2\theta + \frac{1}{3}\sin^3 2\theta + \frac{1}{5}\sin^5 2\theta + \dots =$

A.  $\log \tan \theta$

B.  $\log \tan\left(\frac{\pi}{4} + \theta\right)$

C.  $\log \tan\left(\frac{\pi}{4} - \theta\right)$

D.  $\log \tan \frac{\theta}{2}$

**Answer: B**



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$$67. \cos 2\theta + \frac{1}{3}\cos^3 2\theta + \frac{1}{5}\cos^5 2\theta + \dots =$$

A.  $\log \tan \theta$

B.  $\log \tan\left(\frac{\pi}{4} + \theta\right)$

C.  $\log \tan\left(\frac{\pi}{4} - \theta\right)$

D.  $\log \cot \theta$

**Answer: D**



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$$68. \tan \theta + \frac{1}{3}\tan^3 \theta + \frac{1}{5}\tan^5 \theta + \dots =$$

A.  $\log \tan \theta$

B.  $\frac{1}{2} \log \tan\left(\frac{\pi}{4} + \theta\right)$

C.  $\frac{1}{2} \log \tan\left(\frac{\pi}{4} - \theta\right)$

D.  $\log \cot \theta$

**Answer: B**



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**69.** The sum of the series  $\log_4 2 - \log_8 2 + \log_{16} 2 - \dots$  is

A.  $e^2$

B.  $\log_2 2 + 1$

C.  $\log_e 3 - 2$

D.  $1 - \log_e 2$

**Answer: D**



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

$$\frac{1}{2} \log_e x + \frac{1}{2} \log_e z + \frac{1}{2xz + 1} + \frac{1}{3} \left( \frac{1}{2xz + 1} \right)^3 + \dots =$$

A.  $\log_e x$

B.  $\log_e y$

C.  $\log_e z$

D. none

**Answer: B**



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### Exercise 2 Set 1

1. The coefficient of  $x^n$  in  $\frac{1+x}{1!} + \frac{(1+x)^2}{2!} + \frac{(1+x)^3}{3!} + \dots$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

**Answer: A**

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$$2. I: \frac{2}{1!} + \frac{4}{3!} + \frac{6}{5!} + \dots = e - 1$$

$$II: \frac{3}{2!} + \frac{5}{4!} + \frac{7}{6!} + \frac{9}{8!} + \dots = e - 1$$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

**Answer: B**

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$$3. I: \frac{1}{1!} + \frac{1+2}{2!} + \frac{1+2+2^2}{3!} + \dots = e^2 - e$$

$$II: \frac{2}{2!} + \frac{2+4}{3!} + \frac{2+4+6}{4!} + \dots = e$$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

**Answer: C**



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$$4. I: 2 \left[ \left(\frac{1}{3}\right) + \frac{1}{3} \left(\frac{1}{3}\right)^3 + \frac{1}{5} \left(\frac{1}{3}\right)^5 + \dots \right] = \log_e 2$$

$$II: 2 \left[ \left(\frac{1}{2}\right) + \frac{1}{3} \left(\frac{1}{2}\right)^3 + \frac{1}{5} \left(\frac{1}{2}\right)^5 + \dots \right] = \log_e 2$$

A. only I is true

B. only II is true



C. both I and II are true

D. neither I nor II true

**Answer: A**



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$$5. I: \frac{1}{1.2} + \frac{1}{3.4} + \frac{1}{5.6} + \dots \log_e 2$$

$$II: \frac{1}{1.2} - \frac{1}{2.3} + \frac{1}{3.4} - \frac{1}{4.5} + \dots = 2 \log_e 2 - 1$$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

**Answer: C**



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6. I : If  $y = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$  then  $x = y + \frac{y^2}{2!} + \frac{y^3}{3!} + \dots$

II : If  $y = x + \frac{x^2}{2} + \frac{x^3}{3} + \dots \infty$ , then  $x = y - \frac{y^2}{2!} + \frac{y^3}{3!} - \frac{y^4}{4!} + \dots$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II true

**Answer: B**



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## Exercise 2 Set 2

1. If

$$1 + \frac{2}{1!} + \frac{4}{2!} + \frac{8}{3!} + \dots = e^a, \quad 1 + \frac{4}{1!} + \frac{16}{2!} + \frac{64}{3!} + \dots = e^b, \quad 1 - \frac{2}{1!} - \dots$$

then the ascending order of a, b, c is

A. a,b,c

B. b,c,a

C. c,a,b

D. a,c,b

**Answer: C**



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2.

If

$$1^2 + \frac{2^2}{2!} + \frac{3^2}{3!} + \frac{4^2}{4!} + \dots = ae, \frac{1^2 \cdot 2}{1!} + \frac{2^2 \cdot 3}{2!} + \frac{3^2 \cdot 4}{3!} + \dots = be, \frac{1}{2!} + \dots$$

then the descending order of a,b,c is

A. a,b,c

B. b,a,c

C. c,a,b

D. a,c,b

**Answer: C**



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3. If  $a, b, c$  are the fifth terms of  $\log_e(3/2), \log_e(4/3), \log_e(6/5)$  then the ascending order of  $a, b, c$  is

A.  $a, b, c$

B.  $b, c, a$

C.  $c, a, b$

D.  $a, c, b$

**Answer: A**



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4.

If

$$\frac{3}{4} + \frac{1}{3} \left( \frac{3}{4} \right)^3 + \frac{1}{5} \left( \frac{3}{4} \right)^5 + \dots = \log_e a, \frac{1}{3} + \frac{1}{3 \cdot 3^3} + \frac{1}{5 \cdot 3^5} + \frac{1}{7 \cdot 3^7} + \dots$$

$1 + \frac{1}{3.2^2} + \frac{1}{5.2^4} + \frac{1}{7.2^6} + \dots = \log_e c$  then the ascending order of a, b, c is

A. a,b,c

B. b,a,c

C. c,a,b

D. a,c,b

**Answer: B**



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5.  $\frac{1}{1.3} + \frac{1}{2} \left( \frac{1}{3.5} \right) + \frac{1}{3} \left( \frac{1}{5.7} \right) + \dots =$

A. a,b,c

B. b,c,a

C. c,a,b

D. a,c,b

Answer: B



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## Exercise 2 Set 3

### 1. Match the following

I. The  $(n + 1)$ th term in the expansion of  $e^5$  is

a)  $\frac{(-3x)^n}{n!}$

II. The  $(n + 1)$ th term in the expansion of  $e^{4x}$  is

b)  $\frac{(-2)^n}{n!}$

III. The  $(n + 1)$ th term in the expansion of  $e^{-2}$  is

c)  $\frac{(4x)^n}{n!}$

IV. The  $(n + 1)$ th term in the expansion of  $e^{-3x}$  is

d)  $\frac{5^n}{n!}$

A. c,d,a,b

B. b,a,d,c

C. c,a,b,d

D. d,c,b,a

Answer: D



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## 2. Match the following

I.  $1 + \frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots =$

a)  $\frac{1}{2} (e - e^{-1})$

II.  $1 + \frac{1}{3!} + \frac{1}{5!} + \dots =$

b)  $\frac{1}{2} (e + e^{-1})$

III.  $\frac{3}{2!} + \frac{5}{4!} + \frac{7}{6!} + \frac{9}{8!} + \dots =$

c)  $\frac{e}{2}$

IV.  $1 + \frac{2}{3!} + \frac{3}{5!} + \frac{4}{7!} + \dots =$

d)  $e - 1$

A. c,d,a,b

B. b,a,d,c

C. c,a,b,d

D. d,c,b,a

**Answer: B**



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$$\text{I. } 1 + \frac{2x}{1!} + \frac{3x^2}{2!} + \frac{4x^3}{3!} + \dots =$$

$$\text{a) } (x^2 + 7x + 8) e^x - 8$$

$$\text{II. } 1 - 2 + \frac{2 \cdot 3}{1!} x + \frac{3 \cdot 4}{2!} x^2 + \dots =$$

$$\text{b) } (x + 1) e^x$$

$$\text{III. } \frac{3 \cdot 5}{1!} x + \frac{4 \cdot 6}{2!} x^2 + \frac{5 \cdot 7}{3!} x^3 + \dots =$$

$$\text{c) } (x^2 + 4x + 2) e^x$$

3.

A. a,c,b

B. b,c,a

C. c,a,b

D. c,b,a

Answer: B



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Match the following.

$$\text{I. } 2 \left[ \left( \frac{1}{3} \right) + \frac{1}{3} \left( \frac{1}{3} \right)^3 + \frac{1}{5} \left( \frac{1}{3} \right)^5 + \dots \right] =$$

$$\text{a) } \log_e 3$$

$$\text{II. } 2 \left[ \left( \frac{1}{2} \right) + \frac{1}{3} \left( \frac{1}{2} \right)^3 + \frac{1}{5} \left( \frac{1}{2} \right)^5 + \dots \right] =$$

$$\text{b) } \log_e 5$$

$$\text{III. } 2 \left[ \left( \frac{2}{3} \right) + \frac{1}{3} \left( \frac{2}{3} \right)^3 + \frac{1}{5} \left( \frac{2}{3} \right)^5 + \dots \right] =$$

$$\text{c) } \log_e 2$$

4.

A. a,c,b



B. b,c,a

C. c,a,b

D. c,b,a

**Answer: C**



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Match the following.

I.  $\frac{1}{1 \cdot 3} + \frac{1}{2} \left( \frac{1}{3 \cdot 5} \right) + \frac{1}{3} \left( \frac{1}{5 \cdot 7} \right) + \dots =$

a)  $\frac{1}{2} \log_e 2$

II.  $\frac{1}{2} \left( \frac{1}{5} \right)^2 + \frac{2}{3} \left( \frac{1}{5} \right)^3 + \frac{3}{4} \left( \frac{1}{5} \right)^4 + \dots$

b)  $\log_e \left( \frac{2}{e} \right)$

III.  $\frac{1}{2} \left( \frac{1}{2} + \frac{1}{3} \right) - \frac{1}{4} \left( \frac{1}{2^2} + \frac{1}{3^2} \right) + \frac{1}{6} \left( \frac{1}{2^3} + \frac{1}{3^3} \right) - \dots$

c)  $\frac{1}{4} + \log_e \left( \frac{4}{5} \right)$

5.

A. a,c,b

B. b,c,a

C. c,a,b

D. c,b,a

**Answer: B**



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## Exercise 2 Set 4

1. A : The value of  $e$  lies between 2 and 3.

$$R : e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \dots$$

- A. Both A and R are true and R is the correct explanation of A
- B. Both A and R are true but R is not correct explanation of A
- C. A is true but R is false
- D. A is false but R is true

**Answer: A**



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$$2. A : \log_e 3 + \frac{(\log_e 3)^2}{2!} + \frac{(\log_e 3)^3}{3!} + \dots = 2$$

R : If

$$x, a \in R \text{ and } a > 0 \text{ then } a^x = 1 + x \log_e a + \frac{x^2}{2!} (\log_e a)^2 + \frac{x^3}{3!} (\log_e a)^3 + \dots$$

- A. Both A and R are true and R is the correct explanation of A
- B. Both A and R are true but R is not correct explanation of A
- C. A is true but R is false
- D. A is false but R is true

**Answer: A**



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$$3. A : \frac{3^2}{2!} + \frac{3^4}{4!} + \frac{3^6}{6!} + \dots = \cosh 3 - 1. \quad \text{"R: } \cosh x = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots$$

- A. Both A and R are true and R is the correct explanation of A
- B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

**Answer: A**



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$$4. A: \frac{1}{2} - \frac{1}{2} \cdot \frac{1}{2^2} + \frac{1}{3} \cdot \frac{1}{2^3} - \frac{1}{4} \cdot \frac{1}{2^4} + \dots = \log_e \left( \frac{3}{2} \right)$$

$$R: \log_e(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$$

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true

**Answer: A**



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$$5. A: \frac{a-b}{a} + \frac{1}{2} \left( \frac{a-b}{a} \right)^2 + \frac{1}{3} \left( \frac{a-b}{a} \right)^3 + \dots = \log_e \left( \frac{a}{b} \right)$$

$$R: \log_e(1-x) = -x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \dots$$

- A. Both A and R are true and R is the correct explanation of A
- B. Both A and R are true but R is not correct explanation of A
- C. A is true but R is false
- D. A is false but R is true

**Answer: A**



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