



## MATHS

### BOOKS - OBJECTIVE RD SHARMA MATHS VOL I (HINGLISH)

#### EXPONENTIAL AND LOGARITHMIC SERIES

##### Illustration

1.  $\frac{\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots \text{equals}}{1} + \frac{1}{3!} + \frac{1}{5!} + \dots$

A.  $e+1$

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

C.  $e-1$

D. none of these

Answer: N/A



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2. In the expansion of  $\frac{e^{7x} + e^{3x}}{e^{5x}}$  the constant term is

A. 0

B. 1

C. 2

D. none of these

Answer: N/A



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3. The sum of the series  $1 + \frac{1}{4.2}! + \frac{1}{16.4}! + \frac{1}{64.6}! + \dots \rightarrow \infty$  is (A)

$\frac{e+1}{2}\sqrt{e}$  (B)  $\frac{e-1}{\sqrt{e}}$  (C)  $\frac{e-1}{+}2\sqrt{e}$  (D)  $\frac{e-1}{\sqrt{e}}$

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

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

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

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

**Answer: N/A**



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

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

B.  $e^{1/2}$

C.  $e^{-2}$

D.  $e^{-1}$

**Answer: N/A**



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

A.  $e^{-2}$

B.  $e^2$

C.  $e^{1/2}$

D. none of these

**Answer: N/A**



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6. The coefficient of  $x^{10}$  in the series of  $e^{2x}$  is

A.  $\frac{2^9}{9!}$

B.  $\frac{2^{10}}{10!}$

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

D. none of these

Answer: N/A



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7. The coefficient of  $x^n$  in the expansion of  $e^{a+bx}$  in power of  $x$  is

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

B.  $e^a \frac{b^{n+1}}{n+1}!$

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

D. none of these

Answer: N/A



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

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

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

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

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

**Answer: N/A**



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9. The coefficient of  $x^4$  in the expansion of  $\frac{1 - ax - x^2}{e^x}$  is

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

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

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

D. none of these

**Answer: N/A**



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10. The coefficient of  $x^n$  in the expansion of  $\frac{a + bx + cx^2}{e^x}$  is

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

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

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

D. none of these

Answer: N/A



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11. The coefficient of  $x^n$  in the expansion of  $e^x$  is

A.  $\sum_{r=n}^{\infty} \frac{r^n}{r!}$

B.  $\frac{1}{n!} \sum_{r=1}^{\infty} \frac{r^n}{r!}$

C.  $\frac{1}{n} \sum_{r=1}^{\infty} \frac{r^n}{r!}$

D. none of these

Answer: N/A



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12. The sum of the series

$$\frac{1}{1!} + \frac{2}{2!} + \frac{3}{3!} + \frac{4}{4!} + \dots \text{to } \infty \text{ is}$$

A. e

B. 2e

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

D. none of these

Answer: N/A



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13. The sum of the series

$$\frac{1}{1!}x + \frac{2}{2!}x^2 + \frac{3}{3!}x^3 \dots \text{To } \infty \text{ is}$$



A.  $e^x$

B.  $xe^x$

C.  $xe^x - 1$

D. none of these

**Answer: N/A**



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**14.** The sum of the series

$$\frac{1^2}{1!} + \frac{2^2}{2!} + \frac{3^2}{3!} + \dots \text{to } \infty \text{ is}$$

A.  $e$

B.  $2e$

C.  $3e$

D. none of these

**Answer: N/A**



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15. The sum of the series

$$x + \frac{2^2}{2!}x^2 + \frac{3^2}{3!}x^3 + \dots \text{ to } \infty \text{ is}$$

A.  $x^2 e^x$

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

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

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

Answer: N/A



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16. The sum of the series

$$1 + \frac{2^3}{2!} + \frac{3^3}{3!} + \frac{4^3}{4!} + \dots \text{ to } \infty \text{ is}$$

A.  $2e$

B.  $3e$

C.  $4e$

D.  $5e$

**Answer: N/A**



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**17. The sum of the series**

$$x + \frac{2^3}{2!}x^2 + \frac{3^3}{3!}x^3 + \frac{4^3}{4!}x^4 + \dots \text{to } \infty \text{ is}$$

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

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

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

D.  $x^3e^x$

**Answer: N/A**



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18. The sum of the series

$$1 + \frac{2^4}{2!} + \frac{3^4}{3!} + \frac{4^4}{4!} + \frac{5^4}{5!} + \dots \text{is}$$

A.  $12e$

B.  $5e$

C.  $14e$

D.  $15e$

Answer: N/A



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19. The sum of the series

$$x + \frac{2^4}{2!}x^2 + \frac{3^4}{3!}x^3 + \frac{4^4}{4!} + \dots \text{is}$$

A.  $x^4 e^x$

B.  $(x + x^2 + x^3 + x^4)e^x$

C.  $(x + 7x^2 + 6x^3 + x^4)e^x$

D. none of these

**Answer: N/A**



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20. The value of  $9 + \frac{16}{2!} + \frac{27}{3!} + \frac{42}{4!} + \dots \dots \infty$  is

A.  $9e - 6$

B.  $11e - 6$

C.  $13e - 6$

D.  $12e - 6$

**Answer: N/A**



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

A.  $4e + 3$

B.  $4e - 3$

C.  $3e - 4$

D.  $3e + 4$

Answer: N/A



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22. If  $x - \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \dots$  to  $\infty = y$ , then  $y + \frac{y^2}{2!} + \frac{y^3}{3!} + \dots$   
+ to  $\infty$  is equal to

A.  $e^y - 1$

B.  $\log_e(1 + y)$

C.  $x^3 = e^y$

$$D. x = 1 + e^y$$

Answer: N/A



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23. The sum of the series

$$\left(\frac{a-b}{a}\right) + \frac{1}{2}\left(\frac{a-b}{a}\right)^2 + \frac{1}{3}\left(\frac{a-b}{a}\right)^3 + \dots \infty \text{ is}$$

A.  $\log_e\left(\frac{a}{b}\right)$

B.  $\log_{a-b}(a)$

C.  $\log_b(a)$

D.  $\log_{a-b}(b)$

Answer: N/A



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24.

Prove

that

:

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

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

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

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

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

Answer: N/A


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25. The sum of the infinite series

$$\left(\frac{1}{3}\right)^2 + \frac{1}{3}\left(\frac{1}{3}\right)^4 + \frac{1}{5}\left(\frac{1}{3}\right)^6 + \dots \text{ is}$$

A.  $\frac{1}{4} \log_e 2$

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



C.  $\frac{1}{6} \log_e 2$

D.  $\frac{1}{4} \frac{\log_e 3}{2}$

**Answer: N/A**



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26. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 - px + q = 0$  then the value of  $(\alpha + \beta)x - \left(\frac{\alpha^2 + \beta^2}{2}\right)x^2 + \left(\frac{\alpha^3 + \beta^3}{3}\right)x^3 + \dots$  is

A.  $\log(1 + px + qx^2)$

B.  $\log(1 + qx + px^2)$

C.  $\log(x^2 + px + q)$

D. none of these

**Answer: N/A**



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27. If  $S = \frac{(y - 1 - \frac{1}{2}(y - 1)^2 + \frac{1}{3}(y - 1))^3}{a - 1 - \frac{1}{2}(a - 1)^2 + \frac{1}{3}(a - 1)^3} \dots$  Then S is equal to

A.  $\log_e y$

B.  $\log_a y$

C.  $\log_e a$

D.  $\log_y a$

Answer: N/A



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28. The coefficient of  $x^n$  in the expansion of  $\log_e(1 + 3x + 2x^2)$  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: N/A



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29. If  $n$  is not a multiple of 3, then the coefficient of  $x^n$  in the expansion of

$\log_e(1 + x + x^2)$  is : (A)  $\frac{1}{n}$  (B)  $\frac{2}{n}$  (C)  $-\frac{1}{n}$  (D)  $-\frac{2}{n}$

A.  $\frac{-2}{n}$

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

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

D. none of these

Answer: N/A



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30. If  $n$  is not a multiple of 3, then the coefficient of  $x^n$  in the expansion

of  $\log_e(1 + x + x^2)$  is : (A)  $\frac{1}{n}$  (B)  $\frac{2}{n}$  (C)  $-\frac{1}{n}$  (D)  $-\frac{2}{n}$

A.  $-\frac{2}{n}$

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

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

D. none of these

**Answer: N/A**



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31.  $\sum_{n=1}^{\infty} \frac{1}{2n(2n+1)}$  is equal to

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

B.  $1 - \log_e 2$

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

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

**Answer: N/A**



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32. The sum of the series

$$\frac{1}{1.23} + \frac{1}{3.45} + \frac{1}{5.67} + \dots \infty \text{ is}$$

A.  $\log_e 2 - \frac{1}{2}$

B.  $\log_e 2$

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

D.  $\log_e 2 + 1$

Answer: N/A



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33. The sum of the series  $\frac{5}{1.2.3} + \frac{7}{3.4.5} + \frac{9}{5.6.7} + \dots$  is equal to

A.  $\log(8/e)$

B.  $\log(e/8)$

C.  $\log 8e$

D.  $\log 8$

**Answer: N/A**



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## Section I Solved Mcqs

1. If  $y = - \left\{ x^3 + \frac{x^6}{2} + \frac{x^9}{3} + \dots \right\}$  then

A.  $x^3 = 1 - e^y$

B.  $x = \log_e(1 + y)$

C.  $x^3 = e^y$

D.  $x = 1 + e^y$

**Answer: N/A**



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2.  $\frac{1}{n!} + \frac{1}{2!(n-2)!} + \frac{1}{4!(n-4)!} + \dots$  to  $n$  terms is equal to

A.  $\frac{2n-1}{2!}$

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

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

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

Answer: N/A



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

A.  $2e$

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

C.  $e$

D.  $3e$

Answer: N/A



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4.  $\frac{2}{1!} + \frac{4}{3!} + \frac{6}{5!} + \dots \infty$  is equal to

A.  $e+1$

B.  $e-1$

C.  $e^{-1}$

D.  $e$

Answer: N/A



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5. The coefficient of  $x^{10}$  in the expansion of  $f10^x$  in ascending power of  $x$  is

A.  $\frac{(\log_e 10)^{10}}{10!}$



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

C.  $\frac{(\log_{10} e)^{10}}{10!}$

D. none of these

**Answer: N/A**

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6. In the expansion of  $\frac{e^x - 1 - x}{x^2}$  in ascending powers of  $x$  the fourth term is

A.  $\frac{x^3}{5!}$

B.  $\frac{x^4}{4!}$

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

D. none of these

**Answer: N/A**

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7. In the expansion of  $\log_{10}(1 - x)$ ,  $|x| < 1$  the coefficient of  $x^n$  is

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

B.  $-\frac{1}{n} \log 10^e$

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

D.  $\frac{1}{n} \log 10^e$

Answer: N/A



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8. Sum of series  $\frac{9}{1!} + \frac{19}{2!} + \frac{35}{3!} + \frac{57}{4!} + \dots$  (A)  $7e - 3$  (B)  $12e - 5$  (C)

$16e - 5$  (D) none

A.  $16e - 5$

B.  $7e - 3$

C.  $12e - 5$

D.  $11e - 5$

**Answer: N/A**



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9. The constant term in the expansion of  $\frac{3^x - 2^x}{x^2}$  is

A.  $\log_e 3$

B.  $(\log_e 6) \times \left\{ (\log_e) \left( \frac{3}{2} \right) \right\}$

C.  $\frac{1}{2} (\log_e 6) \times \left\{ (\log_e) \left( \frac{3}{2} \right) \right\}$

D. none of these

**Answer: N/A**



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10.  $\sum_{n=1}^{\infty} \frac{x^{2n}}{2n - 1}$  is equal to

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

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

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

D. none of these

**Answer: N/A**



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**11. Then sum of the series**

$$1 + \frac{1+3}{2!}x + \frac{1+3+5}{3!}x^2 + \frac{1+3+5+7}{4!}x^3 + \dots$$

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

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

C.  $xe^x + 1$

D.  $d + e^x$

**Answer: N/A**



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12.

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

A.  $e^2 + e^{-2}$

B.  $\frac{e^4 - e^{-4}}{2}$

C.  $\frac{e^4 + e^{-4}}{2}$

D.  $e^4 + e^{-4}$

Answer: N/A



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13. Let  $S = x - \frac{x^3}{3!} + \frac{x^5}{5!} \dots$  and  $C = 1 - \frac{x^2}{2!} + \frac{x^4}{4!}$  Then,

A.  $C^2 + S^2$  is not independent of  $x$

B.  $2CS = \sin 2x$

C.  $C^2 - S^2$  is independent of x

D. none of these

**Answer: a,b,c**



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14. The sum of series  $\frac{2}{3!} + \frac{4}{5!} + \frac{6}{7!} + \dots \dots \dots \infty$  is :

A.  $e^{-1}$

B.  $2e$

C.  $e^{-2}$

D.  $2e^{-2}$

**Answer: N/A**



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15. The sum of the series  $S = \sum_{n=1}^{\infty} \frac{1}{n-1}!$  is

A.  $1/e$

B.  $e^2$

C.  $-e^2$

D.  $e$

Answer: N/A



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16. The sum of the series  $\log_e(3) + \frac{(\log_e(3))^3}{3!} + \frac{(\log_e(3))^5}{5!} + \dots +$  is

A. 3

B. 2

C. 1

D. 0

**Answer: N/A**



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**17.** The value of

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

A.  $\log_e x$

B.  $-\log_e x$

C.  $2 \log_e x$

D.  $x$

**Answer: N/A**



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**18.**  $(1 + 3)\log_e 3 + \frac{1 + 3^2}{2!}(\log_e 3)^2 + \frac{1 + 3^3}{3!}(\log_e 3)^3 + \dots \infty =$  (a)28

(b) 30 (c)25 (d) 0



A. 18

B. 28

C. 36

D. none of these

**Answer: N/A**



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**19.** If  $a > 0$  and  $x \in R$ , then

$1 + (x \log_e a) + \frac{x^2}{2!}(\log_e a)^2 + \frac{x^3}{3!}(\log_e a)^3 + \dots \infty$  is equal to

A.  $a$

B.  $a^x$

C.  $a^{\log_e a}$

D.  $x$

**Answer: N/A**



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20.  $\frac{2}{2!} + \frac{2+4}{3!} + \frac{2+4+6}{4!} + \dots \infty$  is equal to

A.  $e - 2$

B.  $e - 1$

C.  $e$

D.  $e^{-1}$

Answer: N/A



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21.  $1 + \frac{2x}{1!} + \frac{3x^2}{2!} + \frac{4x^3}{3!} + \dots \infty$  is equal to

A.  $xe^x$

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

C.  $xe^{-x}$

D.  $(x + 1)e^{-x}$

**Answer: N/A**



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22.  $\frac{1}{2} \left( \frac{1}{2} + \frac{1}{3} \right) - \frac{1}{4} \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{6} \frac{1}{2^3} + \frac{1}{3^3} + \dots \infty$  is equal to

A.  $\log_e 2$

B.  $\log_e 3$

C.  $\log_e \sqrt{2}$

D.  $\log_e \sqrt{3}$

**Answer: N/A**



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23. The sum of series

$$\frac{(1)^2}{1.2!} + \frac{1^2 + 2^2}{2.3!} + (1^2 + 2^2 + 3^2) / (3.4!) + \dots + \frac{1^2 + 2^2 + \dots + n^2}{n. (n + 1)!} + \dots$$

is equals to

A.  $e^2$

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

C.  $\frac{3e - 1}{6}$

D. 40

Answer: N/A



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24. The sum of the series  $\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots \rightarrow \infty$  is

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

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

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

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

Answer: N/A



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25. If  $0 < y < 2^{1/3}$  and  $x(y^3 - 1) = 1$  then

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

A.  $\log\left(\frac{y^3}{2 - y^3}\right)$

B.  $\log\left(\frac{y^3}{1 - y^3}\right)$

C.  $\log\left(\frac{2y^3}{1 - y^3}\right)$

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

Answer: N/A



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26. The sum of the series

$$\frac{1}{2!} + \frac{1+2}{3!} + \frac{1+2+3}{4!} + \dots \rightarrow \infty \text{ is equal to}$$

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

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

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

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

Answer: N/A



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## Section II Assertion Reason Type

1. Statement -1: The sum of the series

$$\frac{1}{1!} + \frac{2}{2!} + \frac{3}{3!} + \frac{4}{4!} + \dots \rightarrow \infty \text{ is } e$$

Statement 2: The sum of the series

$$\frac{1}{1!}x + \frac{2}{2!}x^2 + \frac{3}{3!}x^3 + \frac{4}{4!}x^4 \dots \rightarrow \infty \text{ is } xe^x$$

A. 1

B. 2

C. 3

D. 4

**Answer: N/A**



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2. Let  $x$  and  $a$  be positive real numbers

Statement 1: The sum of the series

$$1 + \frac{(\log_e x)^2}{2!} + \frac{(\log_e x)^3}{3!} + (\log_e x)^2 + \dots \rightarrow \infty \text{ is } x$$

Statement 2: The sum of the series

$$1 + (x \log_e a) + \frac{x^2 (\log_e x)^2}{2!} + \frac{x^3 (\log_e a)^3}{3!} + \dots \rightarrow \infty \text{ is } a^x$$

A. 1

B. 2

C. 3

D. 4

Answer: N/A



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3. 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:

$a+b+c$

$$= e^x, a + bw + cw^2 = e^{wx} \text{ and } a + bw^2 + cw = e^{w^2x}$$

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

A. 1

B. 2

C. 3

D. 4



Answer: N/A



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4. Let  $n$  be a natural number and  $0 < x < 1$

Statement 1: The coefficient of  $x^n$  in  $\frac{\log(1)}{1+x+x^2}$  is  $\frac{1}{n}$  when  $n$  is not a multiple of 3

Statement 2: The coefficient of  $x^n$  in  $\frac{\log(1)}{1-x+x^2-x^3}$  is  $\frac{1}{n}$  when  $n$  is an odd natural number

A. 1

B. 2

C. 3

D. 4

Answer: N/A



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5. Statement 1: If

$$\log(1 - x + x^2) = a_1x + a_2x^{3^2} + a_3x^3 + \dots$$

$$\text{then } a_3 + a_6 + a_9 + \dots = \frac{2}{3} \log_e 2$$

$$\text{Statement 2: } 1 - \frac{1}{2} + \frac{1}{3} - \frac{11}{4} + \frac{1}{5} - \frac{1}{6} + \dots = \log_e 2$$

A. 1

B. 2

C. 3

D. 4

Answer: N/A



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Exercise

1. The value of  $\sqrt{c}$  rounded off of three decimal places is

A. 1.648

B. 1.65

C. 1.652

D. none of these

**Answer: a**



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**2. The sum of the series**

$$1 + \frac{1+a}{2!} + \frac{1+a+a^2}{3!} + \frac{1+a+a^2+a^3}{4!} + \dots \text{is}$$

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

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

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

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

**Answer: a**



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3. The sum of the series  $\sum_{n=1}^{\infty} \frac{2n}{(2n+1)!}$  is

A.  $e$

B.  $e^{-1}$

C.  $2e$

D.  $2e^{-1}$

Answer: b



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4. The value of  $\log_e e - \log_9 e + \log_{27} e - \log_{81} e + \dots \infty$  is

A.  $\log_2 3$

B.  $\log_3 2$

C.  $\log_{10} e$

D.  $\log_e 2$

**Answer: b**



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

A.  $6e$

B.  $6e$

C.  $6e - 1$

D.  $5e$

**Answer: c**



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6. The expansion of  $\left(1 + \frac{x^2}{2!} + \frac{x^4}{4!} \dots\right)^2$  in ascending powers of  $x$  is

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

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

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

D. none of these

**Answer: c**



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7. The coefficient of  $x^n$  in the expansion of  $\left(1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots\right)^2$

When  $n$  is odd is

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

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

C. 0

D.  $\frac{2^{2x}}{n!}$

Answer: b



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8. If  $\alpha, \beta$  are the roots of the equation  $ax^2 + bx + c = 0$  then  $\log(a - bx + cx^2)$  is equal to

A.  $\log a + (\alpha + \beta)x + \frac{\alpha^2 + \beta^1}{2}x^2 + \frac{\alpha^3 + \beta^3}{3}x^3 + \dots$

B.  $\log a + (\alpha + \beta)x + \frac{\alpha^2 + \beta^2}{2}x^2 + \frac{\alpha^3 + \beta^3}{3}x^3 + \dots$

C.  $\log a - (\alpha + \beta)x - \frac{\alpha^2 + \beta^1}{2}x^2 - \frac{\alpha^3 + \beta^3}{3}x^3 + \dots$

D. none of these

Answer: c



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9. The sum of the series

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

A.  $e^2$

B.  $e^2 + e$

C.  $e^2 - e$

D.  $e^2 - e - 1$

Answer: c



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10. The sum of the series

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

A.  $3e$

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

C.  $\frac{31}{6}e$



D.  $\frac{13}{6}e$

Answer: c



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11. The coefficient of  $x^n$  in the series

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

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

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

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

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

Answer: a



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12. The sum of the series  $\frac{1^2 \cdot 2^2}{1!} + \frac{2^2 \cdot 3^2}{2!} + \frac{3^2 \cdot 4^2}{3!} + \dots$  is

A.  $27e$

B.  $24e$

C.  $28e$

D.  $25e$

Answer: a



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13. The value of

$$(x + y)(x - y) + \frac{1}{2!}(x + y)(x - y)(x^2 + y^2) + \frac{1}{3!}(x + y)(x - y)(x^4 + y^4) + \dots$$

... is :

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

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

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

D.  $e^{x^2} + (y^2)$

**Answer: b**



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14. If  $e^x = y + \sqrt{1 + y^2}$  then the value of y is

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

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

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

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

**Answer: d**



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15. If  $\frac{e^{5x} + e^x}{e^{3x}}$  is expanded in a series of ascending powers of  $x$  and  $n$  is an odd natural number then the coefficient of  $x^n$  is

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

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

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

D. none of these

Answer: d



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16. In the expansion of  $\frac{e^{7x} + e^{3x}}{e^{5x}}$  the constant term is

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

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

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

D. none of these

Answer: b

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17. The value of  $\frac{\sqrt{2-1}}{\sqrt{2}} + 3 - 2\frac{\sqrt{2}}{4} + 5\frac{\sqrt{2-7}}{6}\sqrt{2} + 17 - 12\frac{\sqrt{2}}{16} + \dots + \dots + ad$  is

A.  $\log_e 2$

B.  $\log_e \sqrt{2}$

C.  $\log_e 3$

D.  $\log_e \sqrt{3}$

Answer: a

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18. If  $y = 2x^2 - 1$  then  $\frac{1}{x^2} + \frac{1}{2x^4} + \frac{1}{3x^6} + \dots \infty$  equals to

A.  $\log_e \left( \frac{y+1}{y-1} \right)$

B.  $\log_e \left( \frac{1+y}{1-y} \right)$

C.  $\log_e \left( \frac{1-y}{1+y} \right)$

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

**Answer: b**



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19. If  $S = \sum_{n=2}^{\infty} {}^n C_2 \frac{3^{n-2}}{n!}$  then S equals

A.  $e^{3/2}$

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

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

D.  $e^{-3}$

Answer: a



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20. If  $\frac{e^x}{1-x} = B_0 + B_1x + B_2x^2 + \dots + B_nx^n + \dots$ , 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: d



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21. If  $S = \sum_{n=1}^{\infty} \frac{{}^nC_0 + {}^nC_1 + {}^nC_2 + \dots + {}^nC_n}{{}^nP_n}$  then S equals

A.  $2e$

B.  $2e - 1$

C.  $2e + 1$

D. none of these

**Answer: d**



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22. If  $S = \sum_{n=2}^{\infty} \frac{{}^n C_2}{n+1}$  then S equals

A.  $e - 2$

B.  $e + 2$

C.  $2e$

D. none of these

**Answer: b**



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23.  $\frac{1}{1.2} + \frac{1.3}{1.2.3.4} + \frac{1.3.5}{1.2.3.4.5.6} + \dots \infty$

A.  $e - 1$

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

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

D. none of these

**Answer: d**



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24. The sum of the series  $\frac{12}{2!} + \frac{28}{3!} + \frac{50}{4!} + \frac{78}{5!} + \dots$  is

A.  $e$

B.  $3e$

C.  $4e$

D.  $5e$

Answer: a



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25. If  $a = \sum_{n=0}^{\infty} \frac{x^{3n}}{(3n)!}$ ,  $b = \sum_{n=1}^{\infty} \frac{x^{3n-2}}{(3n-2)!}$ ,  $c = \sum_{n=1}^{\infty} \frac{x^{3n-1}}{(3n-1)!}$

then the value of  $a^3 + b^3 + c^3 - 3abc$  is

A. 1

B. 0

C. -1

D. -2

Answer: a



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26. If  $S_n$  denotes the sum of the products of the products of the first  $n$  natural number taken two at a time then  $\sum_{n=0}^{\infty} \frac{S_n}{n+1!}$  equals

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

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

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

D. none of these

**Answer: b**



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27.  $\sum_{n=0}^{\infty} \frac{(\log_e x)^n}{n!}$  is equals to

A.  $\log_e x$

B.  $x$

C.  $\log_x e$

D. none of these

Answer: b



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28. If  $a = \sum_{n=1}^{\infty} \frac{2n}{2n-1!}$ ,  $b = \sum_{(n=1)}^{\infty} \frac{2n}{2n+1!}$  then  $ab$  equals

A. 1

B.  $e^2$

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

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

Answer: a



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29. The value of

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

is

A.  $e^{a^x}$

B.  $e^{-a^x}$

C. 0

D. 1

Answer: d



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30. If  $S_n = \frac{1^2 \cdot (2)}{1!} + \frac{2^2 \cdot 3}{2!} + \frac{3^2 \cdot 4}{3!} + \dots + \frac{n^2 \cdot (n+1)}{n!}$  then

$\lim_{n \rightarrow \infty} S_n$  is equal to

A.  $3e$

B.  $5e$

C.  $7e$

D.  $9e$

**Answer: c**



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31. If  $S = \sum_{n=0}^{\infty} \frac{(\log x)^{2n}}{2n!}$ , then S equals

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

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

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

D. none of these

**Answer: c**



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

A.  $y=2x$

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

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

D. none of these

Answer: c



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33. The value of  $\log 2 + 2 \left( \frac{1}{5} + \frac{1}{3} \cdot \frac{1}{5^3} + \frac{1}{5} \cdot \frac{1}{5^5} + \dots + \infty \right)$  is

A.  $\log 2 + \log 3$

B.  $\log 2 + 2$

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

D.  $\log 3$

Answer: d



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34. The sum of the series  $\frac{1}{1.2} - \frac{1}{2.3} + \frac{1}{3.4} - \frac{1}{4.5} + \dots$  is

A.  $\log_e \left( \frac{4}{e} \right)$

B.  $\frac{4}{e}$

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

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

Answer: b



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35.  $e^{(x-1)} - \frac{1}{2}(x-1)^2 + \frac{(x-1)^3}{3} - \frac{(x-1)^4}{4} + \dots$  is equal to

A.  $\log(x - 1)$



B.  $\log x$

C.  $x$

D. none of these

**Answer: c**



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36.  $2 \left\{ \frac{m-n}{m+n} + \frac{1}{3} \left( \frac{m-n}{m+n} \right)^3 + \frac{1}{5} \left( \frac{m-n}{m+n} \right)^5 + \dots \right\}$  is equals to

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

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

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

D. none of these

**Answer: a**



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37.  $\log_4 2 - \log_8 2 + \log_{16} 2 - \dots \dots \infty$

A.  $e^{-2}$

B.  $\log_e 2 + 1$

C.  $\log_e 3 - 2$

D.  $1 - \log_e 2$

Answer: d



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## Chapter Test

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

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

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

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

D. none of these

Answer: a



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

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

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

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

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

Answer: b



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3. The coefficient of  $x^n$  in the expansion of

$$\frac{\log_e(1)}{1 + x + x^2 + x^3} \text{ when } n \text{ is odd is}$$

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

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

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

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

Answer: b



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4. If  $x \neq 0$  then the sum of the series

$$1 + \frac{x}{2!} + \frac{2x^2}{3!} + \frac{3x^3}{4!} + \dots \rightarrow \infty \text{ is}$$

A.  $\frac{e^x + 1}{x}$

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

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

D. none of these

**Answer: d**



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5. If  $\log(1 - x + x^2) = a_1x + a_2x^2 + a_3x^3 + \dots$  and  $n$  is not a multiple of 3 then  $a_n$  is equal to

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

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

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

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

**Answer: b**



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6. If  $\log(1 - x + x^2) = a_1x + a_2x^2 + a_3x^3 + \dots$

then  $a_3 + a_6 + a_9 + \dots$  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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7. The coefficient of  $x^n$  in the expansion of  $\log_a(1 + x)$  is

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

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

C.  $\frac{(-1)^{n-1}}{n} \log_e a$

$$D. -\frac{1^{n-1}}{n} \log_a e$$

**Answer: b**



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

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

B.  $-\frac{1}{r \log_e 10}$

C.  $\frac{1}{r! \log_e 10}$

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

**Answer: a**



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9. The sum of the series

$$\frac{x-1}{x+1} + \frac{1}{2} \frac{x^2-1}{(x+1)^2} + \frac{1}{3} \frac{x^3-1}{(x+1)^3} + \dots \text{is equal to}$$

- A.  $\log_e x$
- B.  $2 \log_e x$
- C.  $-\log_e(x+1)$
- D. none of these

Answer: a



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10. The sum of series  $2[7^{-1} + 3^{-1} \cdot 7^{-3} + 5^{-1} \cdot 7^{-5} + \dots]$  is

- A.  $\log_e \left( \frac{4}{3} \right)$
- B.  $\log_e \left( \frac{3}{4} \right)$
- C.  $2 \log_e \left( \frac{3}{4} \right)$



D.  $2 \log e \left( \frac{4}{3} \right)$

**Answer: a**

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**11.** The coefficient of  $x^6$  in the expansion of

$\log \left\{ (1+x)^{1+x} (1-x)^{1-x} \right\}$  is

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

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

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

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

**Answer: a**

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12. The sum of the series  $\frac{1}{2}x^2 + \frac{2}{3}x^3 + \frac{3}{4}x^4 + \frac{4}{5}x^5 + \dots$  is :

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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13. If  $x, y, z$  are three consecutive positive integers and  $X - Z + 2 = 0$ ,

then  $\frac{1}{2}\log_e x + \frac{1}{2}\log_e z + \frac{1}{2xz+1} + \frac{1}{3}\left(\frac{1}{2xz+1}\right)^3 + \dots$  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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14. The sum of the series  $\frac{(1)^2 \cdot 2}{1!} + \frac{2^2 \cdot 3}{2!} + \frac{3^2 \cdot 4}{3!} + \frac{4^2 \cdot 5}{4!} + \dots$  is

A.  $5e$

B.  $3e$

C.  $7e$

D.  $2e$

Answer: c

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15. The value of  $1 - \log_e 2 + \frac{(\log_e 2)^2}{2!} - \frac{(\log_e 2)^3}{3!} + \dots$  is

A. 2

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

C.  $\log_e 3$

D. none of these

**Answer: b**

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16.  $1 + \frac{(\log_e n)^2}{2!} + \frac{(\log_e n)^4}{4!} + \dots =$

A. n

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

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

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

**Answer: c**

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

A.  $e^{1/2}$

B.  $e^{-1}$

C.  $e$

D.  $e^{-1/3}$

**Answer: b**



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

A.  $\frac{1}{6} \log_e 2 - \frac{1}{24}$

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

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

D. none of these

**Answer: a**



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**19.** The value of

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

A. 2

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

C.  $\log_e 3$

D. none of these

**Answer: a**



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

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

B.  $\frac{4}{3}$

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

D.  $-\frac{4}{3}$

**Answer: c**



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