



MATHS

JEE (MAIN AND ADVANCED) MATHEMATICS

EXPONENTIAL SERIES

Exercise I A Class Work

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

A. $\log_e x$

B. x

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

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

Answer: B

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2. If $a > 0, x \in R$ then

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

A. a

B. a^x

C. $a^{\log_e x}$

D. x

Answer: B

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

A. $e^{\frac{1}{2}}$

B. e^{-2}

C. e^{-1}

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

Answer: C



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4. If $\left(1 + \frac{1}{1!} + \frac{1}{2!} + \dots \infty\right) \left(1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \dots \infty\right) =$

A. 1

B. e^{-2}

C. $-e^{-2}$

D. 0

Answer: A



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5. $\frac{16}{2!} + \frac{64}{3!} + \frac{256}{4!} + \dots \cdot \infty =$

A. $e^4 - 1$

B. $e^4 - 2$

C. $e^4 - 4$

D. $e^4 - 5$

Answer: D



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

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

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

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

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

Answer: B



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

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

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

Answer: D



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8. If $e^x = y + \sqrt{1 + y^2}$ then $y =$

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

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

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

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

Answer: B



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9. $\sum_{n=1}^{\infty} \frac{{}^nC_0 + {}^nC_1 + \dots + {}^nC_n}{{}^nP_n} =$

A. e^2

B. $e^2 - 1$

C. e^3

D. $e^3 - 1$

Answer: B



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10. The 6th term in the expansion of 5^x is

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

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

C. $\frac{x^5}{5!}(\log_e 5)^5$

D. $\frac{x^5}{5}(\log_e 5)^5$

Answer: C



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11. Coefficient of x^n in e^{a+bx} is

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

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

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

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

Answer: D



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Exercise I B Home Work

$$1. 1 + \frac{\log_e 5}{1!} + \frac{(\log_e 5)^2}{2!} + \frac{(\log_e 5)^3}{3!} + \dots \infty =$$

A. $e^{\frac{1}{\log 5}}$

B. 5

C. $\frac{1}{5}$

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

Answer: B



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

A. 2

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

C. $\log 3$

D. $\log 4$

Answer: B



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

A. e

B. a

C. a^2

D. e^2

Answer: C



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4. $\left(\frac{1}{1!} + \frac{1}{2!} + 1(3!) + \dots \dots \infty\right) \left(\frac{1}{2!} + \frac{1}{3!} + 1(4!) - \frac{1}{5!} \dots \dots \infty\right)$

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

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

C. $e - 1$

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

Answer: B



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5. $\left(1 - \frac{1}{1!} + \frac{9}{2!} + \frac{27}{3!} + \dots \dots \infty\right) \left(1 + \frac{9}{1!} + \frac{81}{2!} + \frac{729}{3!} + \dots \dots \infty\right)$

=

A. 1

B. e^2

C. e^3

D. e^6

Answer: D



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

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

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

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

D. $\frac{1}{3e}$

Answer: B



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

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

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

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

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

Answer: D



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

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

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

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

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

Answer: B



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9. Coefficient of x^3 in the expansion of e^{-bx}

A. $\frac{-b^3}{6}$

B. $\frac{b^3}{6}$

C. $\frac{b^3}{3}$

D. $\frac{-b^3}{3}$

Answer: A



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

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

- A. A is true, R is true and R is correct explanation of A
- B. A is true, R is true and R is not correct explanation of A
- C. A is true , R is false
- D. A is false, R is true

Answer: A



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Exercise II A Class Work

$$1. 1 + \frac{w^2 x}{1!} + \frac{wx^2}{1!} + \frac{x^3}{3!} + \frac{w^2 x^4}{4!} + \frac{wx^5}{5!} + \frac{wx^5}{5!} + \frac{x^6}{6!} + \dots \infty =$$

A. e^x

B. e^{wx}

C. $e^{\omega^2 x}$

D. e^{ω^2}

Answer: C



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$$2.4 + \frac{9}{2!} + \frac{27}{3!} + \dots =$$

A. e^2

B. e^3

C. e^4

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

Answer: B



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3. Which of the following statement is true

Statement - I $2 < \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots \cdot \infty < 3$

Statement - II $\frac{1}{2} < \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots \cdot \infty < 1$

A. only I

B. only II

C. both I and II

D. neither I nor II

Answer: D



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4. Which one of the following is correct

A. $1 < \log_e 2 < \log_e 3$

B. $\log_e 3 < \log_e 2 < 1$

C. $\log_e 2 < 1 < \log_e 3$

D. $1 < \log_e 3 < \log_e 2$

Answer: C



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5. $\frac{1}{2} + \frac{1}{4} + \frac{1}{8(2)!} + \frac{1}{16(3)!} + \frac{1}{32(4)!} + \dots \cdot \infty =$

A. e

B. $\sqrt{e}$

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

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

Answer: C



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6. Assertion (A) : $x + \frac{x^2}{1!} + \frac{x^3}{2!} + \frac{x^4}{3!} + \dots + \infty = f(x)$

Then the series $f(1), f(2), f(3), f(4) \dots$ Are in G.P .

Reason (R) : In the above series $f'(x) = e^x(x + 2)$

- A. A is true, R is true and R is correct explanation of A
- B. A is true, R is true and R is not correct explanation of A
- C. A is true , R is false
- D. A is false, R is true

Answer: D



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7.

$$(a + b) \cdot (a - b) + \frac{(a + b)(a - b)(a^2 + b^2)}{2!} + \frac{(a + b)(a - b)(a^4 + b^4 + a^2b^2)}{3!} + \dots$$

- A. $e^a + e^b$
- B. e^{a+b}

C. $e^{a^2} - e^{b^3}$

D. $e^{a^2} - e^{b^2}$

Answer: C



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

A. 1

B. e^2

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

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

Answer: A



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

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

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

The ascending order of P,Q,R

A. Q,P,R

B. P,R,Q

C. P,Q,R

D. R,P,Q

Answer: B



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$$10. \text{ If } y = \sum_{n=2}^{\infty} \left({}^n C_2 \cdot \frac{3^{n-2}}{n!} \right) \text{ then } 2y =$$

A. e

B. e^2

C. e^3

D. e^4

Answer: C



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

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

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

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

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

Answer: A



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12. $\sum_{n=0}^{\infty} \frac{(\log_e x)^{2n}}{(2n)!} =$

A. $x + 1$

B. $x - 1$

C. $x^2 + 1$

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

Answer: D



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13. $\left(1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots \cdot \infty\right)^2 - \left(x + \frac{x^3}{3!} + \frac{x^5}{5!} + \dots \cdot \infty\right)^2 =$

A. -1

B. 5

C. 2

D. 1

Answer: D



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14. $1 + 1(4.2!) + \frac{1}{16.4!} + \frac{1}{64.6!} + \dots =$

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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15. $\frac{4}{1!} + \frac{16}{3!} + \frac{64}{5!} + \dots =$

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

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

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

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

Answer: D



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16.
$$\frac{1 + \frac{2^2}{2!} + \frac{2^4}{3!} + \frac{2^6}{4!} + \dots \cdot \infty}{1 + \frac{1}{2!} + \frac{2}{3!} + \frac{2^2}{4!} + \dots \cdot \infty} =$$

A. e^2

B. $e^2 + 1$

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

D. $(e + 1)(e - 1)$

Answer: D



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17. $1 + \frac{1+2}{2!} + \frac{1+2+3}{3!} + \frac{1+2+3+4}{4!} + \dots \infty$

A. e

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

C. $\frac{5e}{2}$

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

Answer: B



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18. $1 + \frac{1}{2!} + \frac{2}{3!} + \frac{4}{2!} + \dots \infty =$

A. e^2

B. $e^2 + 1$

C. $e^2 - 1$

D. $\frac{1}{4}(e^2 + 1)$

Answer: D



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19. $\frac{1.3}{1!} + \frac{2.4}{2!} + \frac{3.5}{3!} + \frac{4.6}{4!} + \dots \infty = \dots$

A. e

B. 2e

C. 3e

D. 4e

Answer: D



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

A. 27 e

B. $17e$

C. $7e$

D. e

Answer: A



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21. Assertion (A) : The value of $\frac{2}{1!} + \frac{6}{2!} + \frac{12}{3!} + \frac{20}{4!} + \dots o = 3e$

Reason (R) : The n^{th} term of the series $2, 6, 12, 20, \dots$ is $n(n+1)$

A. A is true, R is true and R is correct explanation of A

B. A is true, R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false, R is true

Answer: A



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22. Which of the following statement is true

Statement - I Coefficient of x^3 in e^{5x} is $\frac{5^2}{3!}$

Statement - II $\sum_{n=1}^{\infty} \frac{{}^nC_0 + {}^nC_1 + {}^nC_2 + \dots + {}^nC_n}{{}^nP_n} = e^2 - 1$

A. only I

B. only II

C. both I and II

D. neither I nor II

Answer: B



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

A. e^{-1}

B. $e - 1$

C. $e + 1$

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

Answer: B



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

A. $2e - 1$

B. $2e + 1$

C. $6e - 1$

D. $6e + 1$

Answer: C



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

A. e

B. $e^2 + e$

C. e^2

D. $e^2 - e$

Answer: D



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26. Match the following .

List - I

(1) $\frac{1.3}{1} + \frac{2.4}{1.2} + \frac{3.5}{1.2.3} + \frac{4.6}{1.2.3.4} + \dots + \infty$

(2) $\left(1 + \frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots \right)^2$

(3) coefficient x^2 in e^{2x+3}

(4) coefficient of x^4 in $\cosh (2x)$

List - II

(a) $\frac{2}{3}$

(b) $4e$

(c) 1

(d) $2e^3$

A. $\begin{matrix} 1 & 2 & 3 & 4 \\ c & b & d & a \end{matrix}$

- B. $\begin{matrix} 1 & 2 & 3 & 4 \\ c & b & d & a \end{matrix}$
- C. $\begin{matrix} 1 & 2 & 3 & 4 \\ c & b & d & a \end{matrix}$
- D. $\begin{matrix} 1 & 2 & 3 & 4 \\ c & b & d & a \end{matrix}$

Answer: B



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27. If $1 + \frac{1}{2!} + \frac{1.3}{4!} + \frac{13.5}{6!} + \dots \infty = l$

$1 + \frac{2}{2!} + \frac{2+4}{3!} + \frac{2+4+6}{4!} + \dots \infty = m,$

$\frac{1}{2!} + \frac{1+2}{3!} + \frac{1+2+3}{4!} + \dots \infty = n$ then the ascending order of l, m, n is

A. l, m, n

B. n, m, l

C. n, l, m

D. l, n, m

Answer: D



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28. $1 + \frac{2x}{1!} + \frac{3x^2}{2!} + \frac{4x^3}{3!} + \dots \infty =$

A. e^x

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

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

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

Answer: B



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29. $1 + \frac{1 + 2}{2!} + \frac{1 + 2 + 2^2}{3!} + \dots \infty =$

A. $e(e - 1)$

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

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

D. $\frac{e(e-1)}{4}$

Answer: A



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30. If n is odd, then Coefficient of x^n in $\left(1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots \infty\right)^2 =$

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

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

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

D. 0

Answer: D



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31. Coefficient of x^4 in

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

A. $\frac{25}{24}e$

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

C. $\frac{16}{25}e$

D. $\frac{25}{16}e$

Answer: A



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32. If $|x| < 1$, Coefficient of x^3 in $\frac{1}{e^x(1+x)}$ is

A. $\frac{17}{6}$

B. $-\frac{8}{3}$

C. $-\frac{11}{6}$

D. $\frac{11}{6}$

Answer: B



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33. 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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34. If $e^{ax} + e^{-bx} = p_0 + p_1x + p_2x^2 + \dots \infty$ then $(p_0, p_1, p_2) =$

A. $\left(2, a - b, \frac{a^2 + b^2}{2}\right)$

B. $\left(2, a + b, \frac{a^2 + b^2}{2}\right)$

C. $(2, a - b, a^2 + b^2)$

D. $\left(2, a - b, \frac{a^2 - b^2}{2}\right)$

Answer: A



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

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

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

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

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

Answer: A



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36. If $(e^x - 1)^2 = a_0 + a_1x + a_2x^2 + \dots \infty$ then $a_4 =$

A. $\frac{5}{12}$

B. $\frac{7}{12}$

C. $\frac{9}{7}$

D. 0

Answer: B



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37. 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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38. The 4^{th} term in the expansion of $\frac{e^x - 1 - x}{x^2}$ in ascending power of x , is

A. $\frac{1}{5!}x^3$

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

C. $\frac{1}{3!}x^3$

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

Answer: A



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39. Coefficient of x^6 in $\frac{e^{ix} + e^{-ix}}{2}$ is

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

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

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

D. $-\frac{1}{6!}$

Answer: D



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40. Match the following Lists .

List - I

(1) $\frac{1.2}{1!} + \frac{2.3}{2!} + \frac{3.4}{3!} + \dots\infty$

(2) $\frac{2}{3!} + \frac{4}{5!} + \frac{6}{7!} + \dots\infty$

(3) $4\left(1 + \frac{1}{2!} + \frac{2}{3!} + \frac{2^2}{4!} + \dots\infty\right)$

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

List - II

(a) $3e$

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

(c) $e^2 + 1$

(d) $5e$

A. $\begin{matrix} 1 & 2 & 3 & 4 \\ a & e & c & b \end{matrix}$

- B. $\begin{matrix} 1 & 2 & 3 & 4 \\ b & a & c & d \end{matrix}$
- C. $\begin{matrix} 1 & 2 & 3 & 4 \\ a & c & b & d \end{matrix}$
- D. $\begin{matrix} 1 & 2 & 3 & 4 \\ a & d & b & e \end{matrix}$

Answer: A



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Exercise II A Home Work

$$1. 1 + \frac{\omega x}{1!} + \frac{\omega^2 x^2}{2!} + \frac{\omega^3 x^3}{3!} + \frac{\omega^4 x^4}{4!} + \frac{\omega^5 x^5}{5!} + \dots \cdot \infty =$$

A. e^x

B. $e^{\omega x}$

C. $e^{\omega^2 x}$

D. e^{x^2}

Answer: B

2. If $x = 3 + \frac{4}{2!} + \frac{8}{3!} + \frac{16}{4!} + \dots \dots \infty$ then $\frac{1}{x} =$

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

B. e

C. e^2

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

Answer: D

3. If $\sum_{r=1}^{\infty} \frac{C^r}{r!} = 1$ then $C =$

A. 1

B. 2

C. e

D. $\log_e 2$

Answer: D



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4. $p = \sum_{n=0}^{\infty} \frac{x^{3n}}{(3n)!}$, $q = \sum_{n=1}^{\infty} \frac{x^{3n-2}}{(3n-2)!}$, $r = \sum_{n=1}^{\infty} \frac{x^{3n-1}}{(3n-1)!}$ then $p + q + r =$

A. e^x

B. e^{2x}

C. e^{3x}

D. e^2

Answer: A



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5. $\sum_{n=1}^{\infty} \frac{2n}{n!} =$

A. e

B. 2e

C. 3e

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

Answer: B



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6. If $\sum_{n=3}^{\infty} \frac{{}^nC_3}{n!} = a \cdot e^b + c$ then descending order of a, b, c is

A. a,b,c

B. a,c ,b

C. b,c,a

D. b,a,c

Answer: D



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7. If $f(x) = x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \dots$ then $f'(x) =$

A. $\sin hx$

B. $\cos hx$

C. $\operatorname{sech} x$

D. e^x

Answer: B



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

A. $x + !$

B. $x - 1$

C. $x^2 - 1$

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

Answer: D



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

A. 2

B. -2

C. 1

D. -1

Answer: C



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10.
$$\frac{\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots \infty}{1 + \frac{1}{3!} + \frac{1}{5!} + \dots \infty}$$

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

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

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

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

Answer: D



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11. Match the following Lists.

List - I

List - II

(A) The $(n + 1)^{th}$ term in the expansion of e^5

(B) 15^{th} term in the expansion of e^{-2}

(C) Coefficient of x^8 in expansion of e^{3x}

(C) Coefficient of x^2 in expansion of e^{3x+2}

(1) $\frac{2^{14}}{14!}$

(2) $\frac{9}{2}e^2$

(3) $\frac{3^8}{8!}$

(3) $\frac{5^n}{n!}$

The correct match is

A.

A	B	C	D
1	4	3	2

B.

A	B	C	D
4	1	2	3

C.

A	B	C	D
4	1	3	2

D.

A	B	C	D
1	4	2	3

Answer: C



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12. $\frac{1}{3!} + \frac{2}{5!} + \frac{3}{7!} + \dots \cdot \infty =$

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

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

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

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

Answer: B



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

A. e

B. $2e$

C. e^{-1}

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

Answer: A



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14. $1 + \frac{3}{1!} + \frac{5}{2!} + \frac{7}{3!} + \dots \infty =$

A. e

B. $2e$

C. $3e$

D. $4e$

Answer: C



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15. If $a_n = \frac{1 + 2 + 3 + \dots + n}{n!}$ then $a_1 + a_2 + a_3 + \dots \infty =$

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

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

C. $\frac{5e}{2}$

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

Answer: B



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16. Which of the following statement is true

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

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

Statement - III : $1 + \frac{3}{2!} + \frac{7}{3!} + \frac{15}{4!} + \dots \infty = e(e-1)$

A. I, II true

B. II, III true

C. III, I true

D. All are true

Answer: D



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17. Assertion (A) $1 + \frac{3}{2!} + \frac{5}{4!} + \frac{7}{6!} + \dots = e$

Reason (R) : The coefficient of x^2 in

$$1 + \frac{2+3x}{1!} + \frac{(2+3x)^2}{2!} + \dots \infty \text{ is } \frac{9e^2}{2}$$

A. A is true, R is true and R is correct explanation of A

B. A is true, R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false, R is true

Answer: B



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18. $\frac{1}{1!} + \frac{1+3}{2!} + \frac{1+3+5}{3!} + \dots \infty =$

A. e

B. $2e$

C. $\sqrt{e}$

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

Answer: B



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19. $\sum_{r=1}^{\infty} (3r^2 + r + 5) \frac{1}{r!} =$

A. $12e$

B. $12e - 3$

C. $12e - 4$

D. $12e - 5$

Answer: D



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

A. 7e

B. 11e

C. 15 e

D. 17e

Answer: B



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

A. e

B. 3e

C. 5e

D. $7e$

Answer: B



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22. $\frac{1^{2.2}}{1!} + \frac{2^{2.3}}{2!} + \frac{3^{2.4}}{3!} + \dots \infty =$

A. $2e$

B. $3e$

C. $7e$

D. $9e$

Answer: C



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23. $1 + \frac{1+5}{2!} + \frac{1+5+5^2}{3!} + \dots \infty =$

A. $\frac{1}{4}e(e^4 + 1)$

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

C. $\frac{1}{3}e(e^4 + 1)$

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

Answer: B



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24. Coefficient of x^{10} in e^{3x} is

A. 3^{10}

B. $\frac{3^{10}}{10!}$

C. $\frac{3^{10}}{10}$

D. $\frac{3^{10}}{10!}$

Answer: B



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25. Coefficient of x^{10} in $\frac{1-2x}{e^x}$ is

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

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

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

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

Answer: B



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26. Coefficient of x^n in $\frac{e^{5x} + e^x}{e^{2x}}$ is

A. $\frac{1}{n!}(3^n + 1)$

B. $\frac{3^n + 5^n}{n!}$

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

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

Answer: C



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27. If n is odd natural number, then coefficient of x^n in $\frac{e^{5x} + e^x}{e^{3x}}$ is

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

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

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

D. 0

Answer: D



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28. Coefficient of x^{10} in 10^x is

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

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

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

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

Answer: A



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29. Coefficient of x^n in $\frac{1+x}{1!} + \frac{(1+x)^2}{2!} + \frac{(1+x)^3}{3!} + \dots =$

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

B. $\frac{1}{e \cdot n!}$

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

D. $\frac{en}{n!}$

Answer: A



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30. Coefficient of x^n in $1 + \frac{a + bx}{1!} + \frac{(a + bx)^2}{2!} + \dots \infty =$

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

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

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

D. $e^a b^n$

Answer: C



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Exercise iii

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

A. 27

B. 28

C. 32

D. 57

Answer: B



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2. The value of $\sqrt{e}$ up to four decimals is

A. 1.5237

B. 1.2589

C. 1.6484

D. 1.9190

Answer: C



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$$3. \left(1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots \infty \right)^2 =$$

$$A. 1 + \frac{2x^2}{2!} + \frac{2^3x^4}{4!} + \frac{2^5x^6}{6!} + \dots \infty$$

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

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

$$D. e^{2x} + e^{-2x}$$

Answer: A



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

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

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

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

$$D. (x^3 + x^2 - 2x - 1)e^x$$

Answer: B



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5. If $\frac{e^x}{1-x} = B_0 + B_1x + B_2x^2 + \dots + B_{n-1}x^{n-1} + B_nx^n + \dots$

then the value of $(B_n - B_{n-1})$ is

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

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

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

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

Answer: B



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6. If $C = 1 + \frac{\cos x}{1!} + \frac{\cos 2x}{2!} + \frac{\cos 3x}{3!} + \dots$ and

A. $\exp(ix)$

B. $\exp[\cos(\sin x) + i \sin(\sin x)]$

C. $\exp[\exp(ix)]$

D. $\exp(\cos x) [\exp(ix)]$

Answer: C



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7. Coefficient of x^n in e^{e^x} is $\frac{1}{n!}$ k then k =

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

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

C. $\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} + \dots \infty$

D. $1 - \frac{2^n}{2!} + \frac{3^n}{3!} + \dots \infty$

Answer: B



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8. Assertion (A) : $\frac{3^2}{2!} + \frac{3^4}{4!} + \frac{3^6}{4!} + \dots = \text{Cosh } 3 - 1$

Reason (R) : $\text{Cosh } x = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots$

- A. A is true, R is true and R is correct explanation of A
- B. A is true, R is true and R is not correct explanation of A
- C. A is true , R is false
- D. A is false, R is true

Answer: A



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