



MATHS

BOOKS - SAI MATHS (TELUGU ENGLISH)

BINOMIAL THEOREM AND PARTIAL FRACTIONS

Problems

1.

$$x = 1 + \frac{3}{1!} \times \frac{1}{6} + \frac{3 \times 7}{2!} \left(\frac{1}{6}\right)^2 + \frac{3 \times 7 \times 11}{3!} \left(\frac{1}{6}\right)^3 + \dots \Rightarrow x^4 =$$

A. 81

B. 54

C. 27

D. 8

Answer: C



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2. If $|x|$ is so small that x^2 and higher power of x may be neglected then

an approximate value of $\frac{\left(1 + \frac{2}{3}x\right)^{-3} (1 - 15x)^{-1/5}}{(2 - 3x)^4}$ is

A. $\frac{1}{8}(1 + 7x)$

B. $\frac{1}{16}(1 - 7x)$

C. $1 - 7x$

D. $\frac{1}{16}(1 + 7x)$

Answer: D



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3. The coefficient of x^n in the expansion of $\frac{1}{x^2 - 5x + 6}$ for $|x| < 1$ is

A. $\frac{1}{2^{n-1}} - \frac{1}{3^{n-1}}$

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

C. $\frac{1}{2^{n+1}} - \frac{1}{3^{n+1}}$

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

Answer: C

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4. If $|x| < 1$ then the coefficient of x^5 in the expansion of

$$\frac{3x}{(x-2)(x+1)}$$
 is

A. $\frac{33}{32}$

B. $-\frac{33}{32}$

C. $\frac{31}{32}$

D. $-\frac{31}{32}$

Answer: B



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5. If the coefficients of x^9 , x^{10} , x^{11} in the expansion of $(1 + x)^n$ are in arithmetic progression then $n^2 - 41n =$

A. 398

B. 298

C. - 398

D. 198

Answer: C



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6. If $(a + bx)^{-3} = \frac{1}{27} + \frac{1}{3}x + \dots$, then the ordered pair (a, b) equals to

A. $(3, - 27)$

B. $\left(1, \frac{1}{3}\right)$

C. $(3, 9)$

D. $(3, -9)$

Answer: D



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7. The term independent of x in the expansions of $\left(\sqrt{x} - \frac{2}{\sqrt{x}}\right)^{18}$ is

A. $-{}^{18}C_9 2^9$

B. ${}^{18}C_9 2^{12}$

C. ${}^{18}C_6 2^6$

D. ${}^{18}C_6 2^8$

Answer: A



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8. If $\frac{2x^3 + x^2 - 5}{x^4 - 25} = \frac{Ax + B}{x^2 - 5} + \frac{Cx + 1}{x^2 + 5}$, then (A, B, C) equals to

A. (1, 1, 1)

B. (1, 1, 0)

C. (1, 0, 1)

D. (1, 2, 1)

Answer: C



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9. The term independent of x ($x > 0, x \neq 1$) in the expansion of

$$\left[\frac{(x+1)}{(x^{2/3} - x^{1/3} + 1)} - \frac{(x-1)}{(x - \sqrt{x})} \right]^{10} \text{ is}$$

A. 105

B. 210

C. 315

Answer: B [View Text Solution](#)

10. If x is small, so that x^2 and higher powers can be neglected, then the approximate value for $\frac{(1 - 2x)^{-1}(1 - 3x)^{-2}}{(1 - 4x)^{-3}}$

A. $1 - 2x$

B. $1 - 3x$

C. $1 - 4x$

D. $1 - 5x$

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11. If $\frac{1}{x^4 + x^2 + 1} = \frac{Ax + B}{x^2 + x + 1} + \frac{Cx + D}{x^2 - x + 1}$, then $C + D$ is equal to

A. -1

B. 1

C. 2

D. 0

Answer: D



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12. If $ab \neq 0$ and the sum of coefficients of x^7 and x^4 in the expansion of

$\left(\frac{x^2}{a} - \frac{b}{x}\right)^{11}$ is 0, then

A. $a = b$

B. $a + b = 0$

C. $ab = -1$

D. $ab = 1$

Answer: D



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13.
$$\frac{1}{x(x-1)(x+2)\dots(x+n)} = \frac{A_0}{x} + \frac{A_1}{x+1} + \dots + \frac{A_n}{x+n},$$

$0 \leq i \leq r \Rightarrow A_r$ is equal to

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

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

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

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

Answer: B



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14. If the coefficients of r^{th} and $(r + 1)^{th}$ terms in the expansion of $(3 + 7x)^{29}$ are equal, then r is equal to

- A. 14
- B. 15
- C. 18
- D. 21

Answer: D



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15.
$$\frac{x^2 + x + 1}{(x - 1)(x - 2)(x - 3)} = \frac{A}{x - 1} + \frac{B}{x - 2} + \frac{C}{x - 3} \Rightarrow A + C =$$

- A. 4
- B. 5
- C. 6

D. 8

Answer: D



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16. If $(1 + 2x + 3x^2)^{10} = a_0 + a_1x + a_2x^2 + \dots + a_{20}x^{20}$, then $\frac{a_2}{a_1}$ is equal to

A. 10.5

B. 21

C. 10

D. 5.5

Answer: A



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17. For $|x| < \frac{1}{5}$ the coefficient of x^3 in the expansion of $\frac{1}{(1-5x)(1-4x)}$ is

A. 369

B. 370

C. 371

D. 372

Answer: A



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18. if $\frac{3x^2 + x + 1}{(x-1)^4} = \frac{a}{(x-1)} + \frac{b}{(x-1)^2} + \frac{c}{(x-1)^3} + \frac{d}{(x-1)^4}$,

then $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$

A. $\begin{bmatrix} 3 & 7 \\ 5 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 3 \\ 7 & 5 \end{bmatrix}$

C. $\begin{bmatrix} 0 & 7 \\ 3 & 5 \end{bmatrix}$

D. $\begin{bmatrix} 3 & 5 \\ 7 & 0 \end{bmatrix}$

Answer: B



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19. The coefficient of x^{24} in the expansion of $(1 + x^2)^{12}(1 + x^{12})(1 + x^{24})$ is

A. ${}^{12}C_6$

B. ${}^{12}C_6 + 2$

C. ${}^{12}C_6 + 4$

D. ${}^{12}C_6 + 6$

Answer: B



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20. If x is numerically so small so that x^2 and higher powers of x can be neglected, then $\left(1 + \frac{2x}{3}\right)^{3/2} \cdot (32 + 5x)^{-1/5}$ is approximately equal to

A. $\frac{32 + 31x}{64}$

B. $\frac{31 + 32x}{64}$

C. $\frac{31 - 32x}{64}$

D. $\frac{1 - 2x}{64}$

Answer: A



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21. For $|x| < 1$, the constant term in the expansion of $\frac{1}{(x - 1)^2(x - 2)}$ is

A. 2

B. 1

C. 0

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

Answer: D



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22. If $(1 + x + x^2 + x^3)^5 = \sum_{k=0}^{15} a_k x^k$, then $\sum_{k=0}^7 a_{2k}$ is equal to

- A. 128
- B. 256
- C. 512
- D. 1024

Answer: C



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23. If $\alpha = \frac{5}{2!3!} + \frac{5.7}{3!3^2} + \frac{5.7.9}{4!3^3} + \dots$, then $\alpha^2 + 4\alpha$ is equal to

- A. 21

B. 23

C. 25

D. 27

Answer: B



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24. If $\frac{x^2 + x + 1}{x^2 + 2x + 1} = A + \frac{B}{x + 1} + \frac{C}{(x + 1)^2}$, then $A - B$ is equal to

A. $4C$

B. $4C + 1$

C. $3C$

D. $2C$

Answer: D



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25. If a_k is the coefficient of x^k in the expansion of $(1 + x + x^2)^n$ for $k = 0, 1, 2, \dots, 2n$, then $a_1 + 2a_2 + 3a_3 + \dots + 2na_{2n}$ is equal to

A. $-a_0$

B. 3^n

C. $n \cdot 3^{n+1}$

D. $n \cdot 3^n$

Answer: D



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26. The sum of the series

$$\frac{3}{4.8} - \frac{3.5}{4.8.12} + \frac{3.5.7}{4.8.12.16} - \dots \text{ is equal to}$$

A. $\sqrt{\frac{3}{2}} - \frac{3}{4}$

B. $\sqrt{\frac{2}{3}} - \frac{3}{4}$

C. $\sqrt{\frac{3}{2}} - \frac{1}{4}$

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

Answer: B

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27. If $\frac{3x}{(x-a)(x-b)} = \frac{2}{x-a} + \frac{1}{x-b}$, then $a:b$ is equal to

A. 1:2

B. -2:1

C. 1:3

D. 3:1

Answer: B

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28. $1 + \frac{2}{4} + \frac{2.5}{4.8} + \frac{2.5.8}{4.8.12} + \frac{2.5.8.11}{4.8.12.16} + \dots$ is equal to

A. $4^{-2/3}$

B. $3\sqrt{16}$

C. $3\sqrt{4}$

D. $4^{3/2}$

Answer: B
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29. Match the following columns and choose the correct answer.

Column I

(A) $(1 - x)^{-n}$

(B) $(1 - x)^{-n}$

(C) If $x > 1$, then $1 + \frac{1}{x} + \frac{1}{x^2} + \dots$ is

(D) if $|x| > 1$, then $1 - \frac{2}{x^2} + \frac{3}{x^4} - \frac{4}{x^6} + \dots$

Column II

(1) $\frac{x}{x+1}$

(2) $1 - nx + \frac{n(n+1)}{2!}x^2 - \dots$

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

(4) $\frac{x}{x-1}$

(5) $\frac{x^4}{(x^2+1)^2}$

(6) $\frac{x^4}{(x^2-1)^2}$

A. (A) (B) (C) (D)
 1 3 4 5

- B. $\begin{matrix} (A) & (B) & (C) & (D) \\ 2 & 3 & 4 & 5 \end{matrix}$
- C. $\begin{matrix} (A) & (B) & (C) & (D) \\ 3 & 2 & 4 & 5 \end{matrix}$
- D. $\begin{matrix} (A) & (B) & (C) & (D) \\ 2 & 3 & 1 & 5 \end{matrix}$

Answer: C



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30. If $\frac{3x + 2}{(x + 1)(2x^2 + 3)} = \frac{A}{x + 1} + \frac{Bx + C}{2x^2 + 3}$, then $A + C - B$ is equal to

- A. 0
- B. 2
- C. 3
- D. 5

Answer: B



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31. If $(1 + x)^{15} = a_0 + a_1x + \dots + a_{15}$, then $\sum_{r=1}^{15} r \frac{a_r}{a_{r-1}}$ is equal to

A. 110

B. 115

C. 120

D. 135

Answer: C



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32. The coefficient of $x^3y^4z^5$ in the expansion of $(xy + yz + xz)^6$ is

A. 70

B. 60

C. 50

D. None of these

Answer: B



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33. If $|x| < \frac{1}{2}$, then the coefficient of x^r in the expansion of $\frac{1 + 2x}{(1 - 2x)^2}$, is

A. $r2^r$

B. $(2r - 1)2^r$

C. $r2^{2r+1}$

D. $(2r + 1)2^r$

Answer: D



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34. If $\frac{x^3}{(2x - 1)(x + 2)(x - 3)} = A + \frac{B}{2x - 1} + \frac{C}{x + 2} + \frac{D}{x - 3}$, then

A is equal to

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

B. $-\frac{1}{50}$

C. $-\frac{8}{25}$

D. $\frac{27}{25}$

Answer: A

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35. The binomial coefficients which are in decreasing order are

A. ${}^{15}C_5, {}^{15}C_6, {}^{15}C_7$

B. ${}^{15}C_{10}, {}^{15}C_9, {}^{15}C_8$

C. ${}^{15}C_6, {}^{15}C_7, {}^{15}C_8$

D. ${}^{15}C_7, {}^{15}C_6, {}^{15}C_5$

Answer: D

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36. If $\frac{x - 4}{x^2 - 5x + 6}$ can be expanded in the ascending powers of x , then the coefficient of x^3 is

A. $\frac{-73}{648}$

B. $\frac{73}{648}$

C. $\frac{71}{648}$

D. $\frac{-71}{648}$

Answer: A



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37. If $\frac{(x + 1)}{(2x - 1)(3x + 1)} = \frac{A}{(2x - 1)} + \frac{B}{(3x + 1)}$, then $16A + 9B$ is equal to

A. 4

B. 5

C. 6

D. 8

Answer: C



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38. If the coefficient of $(2r + 1)$ th term and $(r + 2)$ th term in the expansion of $(1 + x)^{43}$ are equal, then r is equal to

A. 12

B. 14

C. 16

D. 18

Answer: B



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39. Let a , b and c be such that

$$\frac{1}{(1-x)(1-2x)(1-3x)} = \frac{a}{1-x} + \frac{b}{1-2x} + \frac{c}{1-3x},$$

then

$\frac{a}{1} + \frac{b}{3} + \frac{c}{5}$ is equal to

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

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

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

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

Answer: A



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40. The coefficient of x^5 in the expansion of $(1+x^2)^5(1+x)^4$ is

A. 60

B. 50

C. 40

D. 56

Answer: A



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41. If the coefficient of x in the expansion of $\left(x^2 + \frac{k}{x}\right)^5$ is 270, then k is equal to

A. 1

B. 2

C. 3

D. 4

Answer: C



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42. The sum of the coefficients in the expansion of $(1 + x + x^2)^n$ is

A. 2

B. 2^n

C. 3^n

D. 4^n

Answer: C



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43. In the expansion of $(1 + x)^n$ the coefficients of p th and $(p + 1)$ th terms are respectively p and q , then $p + q$ is equal to

A. n

B. $n + 1$

C. $n + 2$

D. $n + 3$

Answer: B



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44. If $\frac{1 - x + 6x^2}{x - x^3} = \frac{A}{x} + \frac{B}{1 - x} + \frac{C}{1 + x}$, then A is equal to

A. 1

B. 2

C. 3

D. 4

Answer: A



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45. $1 + \frac{1}{4} + \frac{1.3}{4.8} + \frac{1.3.5}{4.8.12} + \dots$ is equal to

A. $\sqrt{2}$

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

C. $\sqrt{3}$

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

Answer: A



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46. The coefficient of x^4 in the expansion of $\frac{(1 - 3x)^2}{(1 - 2x)}$ is equal to

A. 1

B. 2

C. 3

D. 4

Answer: D



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47. If $(1 + x)^n = C_0 + C_1x + C_2x^2 + \dots + C_nx^n$, then $C_0 + 2C_1 + 3C_2 + \dots + (n + 1)C_n$ is equal to

A. $2^n + n \cdot 2^{n-1}$

B. $2^{n-1} + n \cdot 2^n$

C. $2^n + (n + 1)2^n$

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

Answer: A



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48. If $\frac{x - 4}{x^2 - 5x - 2k} = \frac{2}{x - 2} - \frac{1}{x + k}$, then k is equal to

A. -3

B. -2

C. 2

D. 3

Answer: A



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