MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

BINOMIAL THEOREM

Question Bank

1. The number of terms in the expansion of $\left(x+\frac{1}{x}\right)^{29}$ is

A. a) 31

B. b) 30

C. c) 29

D. d) 27

Answer: B

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2. The index of a in the 12th term of the expansion of $(a+2b)^{20}$ is

A. a) 8

B. b) 7

C. c) 9

D. d) 10

Answer: C

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3. The number of terms in the expansion of $(x+y)^5$ is

A. a) 5

B. b) 4

C. c) 6

D. d) 7

Answer: C

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4. The total number of terms in the expansion of $\left(1+2x+x^2\right)^2$ is

A. a) 2

B. b) 3

C. c) 4

D. d) 5

Answer: D

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5. In the expansion of $(1+x)^n$, coefficient of rth term from end is

A. $\hat{} \; nC_r$

B. $\hat{} \; nC_{n-r}$

C. $\hat{} \; nC_{r+1}$

D. $\hat{} \; nC_{n-r+1}$

Answer: D

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6. The middle term in $(2x - 3y)^{12}$ is

A. 6th term

B. 7th term

C. 5th term

D. 8th term

Answer: B

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7. If n is a positive integer, then $\hat{} \ nC_1 +^n C_2 + ... +^n C_n$ is equal to

A. 2^n

B. $2^n - 1$

C. 2^{n-1}

D. $1 - 2^n$

Answer: B

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8. if the coefficients of x^7 & x^8 in the expansion $\left(2 + \frac{x}{3}\right)^n$ are equal then n is equal to

A. 56

B. 55

C. 15

D. 45

Answer: B

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9. The coefficient of x^{-10} in the expansion of $\left(x^2 - \frac{1}{x^3}\right)^{10}$ is

A. -252

B. 210

C. $-(5!)$

D. -210

Answer: B

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10. If a_1, a_2 are the coefficients of x^n in the expansion of $(1+x)^{2n}$ & $(1+x)^{2n-1}$ respectively then $a_1 : a_2$ will be

A. 2:1

B. 1:2

C. 1:1

D. 1:3

Answer: A

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11. The coefficient of x^{10} in the expansion of $1+(1+x)+(1+x)^2+\ldots..+(1+x)^{20}$ is

A. $\hat{}\ 19C_9$

B. $\hat{}\ 20C_{10}$

C. $\hat{}\ 21C_{11}$

D. $\hat{} \ 22C_{12}$

Answer: C

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12. The sum of the coefficients of the terms of the expansion of $(3x - 2y)^n$ is

A. 2^n

B. 1

C. $2^n - 1$

D. 2^{n-1}

Answer: B

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13. The coefficient of the middle term of the expansion of $\left(1-2x+x^2\right)^n$ is

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

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

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

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

Answer: B

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14. The sum of the coefficients in the expansion of $\left(1-2x+2x^2\right)^{2014}$ is

A. 1

B. 0

C. -1

D. 2

Answer: A

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15. The middle term of the expansion of $(4x + 5y)^{18}$ is

A. a) 9th term

B. b) 10th term

C. c) 11th term

D. d) 12th term

Answer: B

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16. The value of $\left(\hat{} \ {}^{8}C_1 + {}^{8}C_2 + {}^{8}C_3 + ... + {}^{8}C_8 \right)$ is

A. 256

B. 255

C. 257

D. 254

Answer: B

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17. The value upto 3 decimal place of $(0.999)^3$ is (applying Binomial Theorem)

A. 0.999

B. 0.998

C. 0.997

D. 0.995

Answer: C

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18. Find the 10th term of $\left(2x^2 + \frac{1}{x}\right)^{12}$.

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19. If rth term in the expansion of $\left(x + \frac{1}{x}\right)^{10}$ is independent of x, then find the value of r.

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20. Find the middle term in the expansion of $\left(x - \frac{1}{2y}\right)^{10}$.

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21. find the value of $(99)^4$.

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22. Find a, if 17th and 18th terms in the expansions of $(2+a)^{50}$ are equal.

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23. If the 3rd term in the expansion of $\left(\frac{1}{x}+x^{\log_{10} x}\right)^5$ is 1000, then find x.

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24. Determine the constant term in the expansion of $\left(x^3-\frac{1}{x^2}\right)^{15}$.

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25. Find the coefficient of x^{20} in the expression of $(1+x^2)^{40}\left(x^2+2+\frac{1}{x^2}\right)^{-5}$.

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26. Find the term independent of x in the expansion of $\left(\sqrt{x}+\frac{1}{3x^2}\right)^{10}$.

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27. Find the coefficient of x in $\left(1-2x^3+3x^5\right)\left(1+x+\frac{1}{x}\right)^{10}$.

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28. In the expansion of $(1+x)^{m+n}$, where m & n are +ve integers, prove that the coefficients of x^m and x^n are equal.

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29. Determine the term independent of x in the expansion of $\left(3x^2-\frac{1}{2x^3}\right)^{10}$.

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30. Find the coefficient of x^5 in the expression of $\left(1+x^2\right)^5(1+x)^4$.

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31. Which term in the expansion of $(1+x)^p\left(1+\frac{1}{x}\right)^q$ is independent of x, where p,q are positive integers ?

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32. Determine the coefficient of x^4 in the expansion of $\left(1+x+x^2+x^3\right)^n$.

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33. Determine the x-free term in $\left(\sqrt{x}-\frac{\sqrt{c}}{\sqrt{x}}\right)^{10}$.

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34. Show that the sum of the coefficients of all odd terms in the expansion of $(1+x)^{2p}$ is 2^{2p-1}.

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35. Find the fifth term form the end in the expansion of $\left(\frac{\sqrt{x}}{3}+\frac{2}{5}x\right)^{11}$.

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36. Show that the middle term in the expansion of $(x+1)^{2n}$ is $\frac{1.3.5.\ldots..(2n-1)}{n!}2^n.x^n$.

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37. The first three terms in the binomial expansion of $(x+y)^n$ are 1,56 and 1372 respectively. Find the values of x and y.

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38. If n be a positive integer, then by using binomial theorem show that $3^{2n+2} - 8n - 9$ is always divisible by 64.

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39. Find the greatest value of the term independent of x in the expansion of $\left(x \sin \alpha + \frac{\cos \alpha}{x}\right)^{10}$, where $\alpha \in R$.

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40. Find the coefficient of x in the expansion $\left(1 - x^2 + 2x^4\right)\left(1 - \frac{1}{x}\right)^6$.

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41. If $\left(1+x+x^2\right)^n = a_0 + a_1 x + a_2 x^2 + \ldots\ldots + a_{2n} x^{2n}$, then prove that $a_0 + a_2 + a_4 + \ldots. + a_{2n} = \frac{1}{2}(3^n + 1)$.

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42. If the coefficients of 2nd, 3rd and 4th terms in the expansion of $(1+x)^{2n}$ are in A.p., then prove that $2n^2 - 9n + 7 = 0$.

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43. If the coefficients of four consecutive terms in the expansion of $(1+x)^n$ are a_1, a_2, a_3 and a_4 respectively. then prove that `a_1/(a_1+a_2)+a_3/(a_3+a_4)=2a_2/(a_2+a_3).

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44. The 3rd,4th and fifth terms in the expansion of $(x+a)^n$ are 252, 1512, and 5670 respectively. Find the values of x,a & n.

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45. The coefficient of three consecutive terms in the expansion of $(1+x)^n$ are a, b, c respectively prove that $\frac{2ac+b(a+c)}{b^2-ac}=n.$

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46. Find the number of integral terms in the expansion of $\left(5^{\frac{1}{2}}+7^{\frac{1}{8}}\right)^{1024}$.

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47. Show that the integral part of the value of $\left(9+4\sqrt{5}\right)^n$ is odd for positive integer .

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48. If the 3rd, 4th. 5th and sixth term in the expansion of $(x+\alpha)^n$ are a,b,c,d respectively, then prove that $\left(\frac{b^2-ac}{c^2-bd}\right)=\frac{5a}{3c}$.

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49. If coefficient of x^2 and x^{11} are 27 and -192 respectively of $\left(1+ax+2x^2\right)^6$ then show that a=-1.

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50. Find the coefficient of x^5 in the expansion of $(1+x)^{21}+(1+x)^{22}+\ldots+(1+x)^{30}$.

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51. Determine the x-independent term in the expansion of $(1+4x)^p\left(1+\frac{1}{4x}\right)^q$ where p & q are positive integers.

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52. For $n \in N$, $2^{3n}-1$ is divisible by

A. a) 7

B. b) 8

C. d) 6

D. d) 16

Answer: A

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53. For $n \in N$, n^3+2n is divisible by

A. a) 6

B. b) 5

C. c) 4

D. d) 3

Answer: D

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54. For $n \in N$, $3^{2n-1} + 2^{n+1}$ is always divisible by

A. a) 5

B. d) 6

C. c) 7

D. d) 9

Answer: C

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55. For $n \in N 2^{3n} - 7n - 1$ is always divisible by

A. a) 49

B. b) 64

C. c) 36

D. d) 81

Answer: A

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56. The greatest positive integer divides (n+1)(n+2).....(n+r) is

A. a) r

B. b) r!

C. c) (n+r)

D. d) (r+1)

Answer: B

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57. Applying the principle of mathematical induction (P.M.I.) prove that $1^2 + 2^2 + 3^2 + \ldots\ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$

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58. Using mathematical induction show 7+77+777+.....+n terms = $\frac{7}{81}\left(10^{n+1} - 9n - 10\right)$

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59. Applying P.M.I. prove that $x^n - y^n$ is always divisible by x+y where n is a pos. even integer

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60. Applying the principle mathematical induction (P.M.I.) show that $5^{2n+2} - 24n - 25$ is always divisible by 576 where n is a natural number.

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61. Applying P.M.I. prove that $(1+x)^n$ gt 1+nx $wherenisapos\int e \geq r$ and nge2 :xgt(-1)`

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62. Prove that $(\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta$ by P.M.I. where n is a pos integer.

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63. For which natural numbers n the inequality $2^n > 2n + 1$is true?

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64. For n being a natural number prove that $1.1! + 2.2! + 3.3! + \ldots . + n.\, n! = (n+1)! - 1$ by applying P.M.I

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65. For $n \in N$, prove that $\left(\frac{n+1}{2}\right)^n >$ n!

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66. Show that $101^{50} > 99^{50} + 100^{50}$

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67. Using P.M.I. prove that $2^n > n$ for all $n \geq 1 : n \in N$

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68. If $n \geq 3$ is an integer prove that $2n + 1 < 2^n$ by P.M.I.

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69. If the binomial coefficient of the $(2r + 4)^{th}$ term and $(r - 2)^{th}$ term in the expansion of $(1 + x)^{18}$ are equal find the value of r.

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70. Find the coefficient of x^7 in $\left(x^2 + \left(\frac{1}{x}\right)\right)^{11}$

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71. Find the greatest term in the expansion of $(2+3x)^9$ if x=3/2

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72. Show that if the greatest term in the expansion of $(1+x)^{2n}$ has also the greatest coefficient then x lies between n/n+1 and n+1/n

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73. If $(1+x)^n = \sum_{r=0}^{} nnCrx^r$ then prove that $C_1 + 2C_2 + 3C_3 + \ldots . nC_n = n2^{n-1}$

A.

B.

C.

D.

Answer:

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74. If $(1+x)^n = \underset{r=0_r}{\overset{n}{C}} x6r$ then prove that $C_0 + 2.\, C_1 + 3.\, C_2 + \ldots\ldots + (n+1)C_n = 2^{n-1}(n+2)$

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75. $(1+x)^n = {}^n C_0 + {}^n C_1 x + {}^n C_2 x^2 + \ldots\ldots\ldots + {}^n C_n x^n$ then find the value of $\hat{}\ nC_1 + \left(2^2\right)^n C_2 + \ldots\ldots + \left(n^2\right)^n C_n$

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76. $(1+x)^n = {}^n C_0 + {}^n C_1 x + {}^n C_2 x^2 + \ldots\ldots\ldots + {}^n C_n x^n$ then find the value of $\hat{}\ nC_0 + {}^n C_1/2 + {}^n C_2/3 + {}^n C_n/n+1$

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77. If $(1+x)^n = {}^nC_0 + {}^nC_1 x + \ldots\ldots + {}^nC_n x^n$ then find the value of

$^nC_0/1 + {}^nC_2/3 + {}^nC_4/5\ldots\ldots$

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78. If $(1+x)^n = {}^nC_0 + {}^nC_1 x + \ldots\ldots + {}^nC_n x^n$ then find

$^nC_0/2 + {}^nC_1/3 + {}^nC_2/4 + \ldots\ldots + {}^nC_n/(n+2)$

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79. If $(1+x)^n = {}^nC_0 + {}^nC_1 x + \ldots\ldots + {}^nC_n x^n$ then find

$^nC_0{}^nC_r + {}^nC_1{}^nC_{r-1} + {}^nC_{n-r}({}^nC_r)$

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80. If $(1+x)^n = {}^nC_0 + {}^nC_1 x + \ldots\ldots + {}^nC_n x^n$ then find

$^nC_0^2 + {}^nC_1^2 + {}^nC_2^2 + {}^nC_n^2$

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81. If $(1+x)^n = {}^nC_0 + {}^nC_1 x + \ldots\ldots + {}^nC_n x^n$ then find the value of

$\hat{} \; nC_1^2 + 2^n C_2^2 + 3^n C_3^2 + \ldots . + n^n C_n^2$

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82. Let $R = \left(5\sqrt{5} + 11\right)^{2n+1}$ and f=R-[R] where [] is the greatest integer function. Prove that Rf=4^{2n+1}

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83. Last three digit of 27^{27}

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84. Find remainder when 7^{103} is divided by 25.

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85. If $n \in I^+$ show $2^{3n+3} - 7n - 8$ is divisible by 49.

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86. Find the coefficient of x^7 in $\left(1 + 3x - 2x^3\right)^{10}$

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87. Find the coefficient of $a^3b^4c^5$ in $(ab + bc + ca)^6$

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88. Expand $\left(x^2 + \left(\frac{3}{x}\right)\right)^4, x \neq 0$

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89. Compute $(98)^5$

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90. Using binomial theorem prove that $6^n - 5n$ always leaves remainder I when divided by 25.

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91. Find a, if 17th and 18th terms in the expansions of $(2+a)^{50}$ are equal.

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92. Find the coefficient of x^6y^3 in the expansion of $(x+2y)^9$

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93. Use the principle of mathematical induction to show that $5^{2+1} + 3^{n+2}.2^{n-1}$ divisible by 19 for all natural number n.

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94. Prove by mathematical induction that $\sum_{r=0}^{n} {}^{n}C_r = n \cdot 2^{n-1}$

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95. For $n \in N$, prove that $\left(\frac{n+1}{2}\right)^n >$ n!

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96. Using mathematical induction to show that $p^{n+1} + (p+1)^{2n-1}$ is divisible by $p^2 + p + 1$ for all $n \in N$

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97. Prove by induction that the integer next greater than $(3+\sqrt{5})6n$ is divisible by 2^n for all $n \in N$

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98. Using the principle of mathematical induction show that $\tan^{-1}\left(\frac{x}{1+1.2.\,x^2}\right)+\tan^{-1}\left(\frac{x}{1+2.3.\,x^2}\right)+\ldots.\tan^{-1}\left(\frac{x}{1+n(n+1)x}\right.$

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99. Prove by induction that

$(1+x_1)(1+x_2)(1+x_3)\ldots\ldots(1+x_n) \geq 1+x_1+x_2+\ldots\ldots+x_n$

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100. Use induction to prove that $3^{2n}-1$ is not exactly divisible by 2^{n+3} for an $n \in N$

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101. $\left(x+\sqrt{x^3-1}\right)^5+\left(x-\sqrt{x^3-1}\right)^5$ is a polynomial of degree

A. 5

B. 6

C. 7

D. 8

Answer: C

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102. if the coefficients of x^7 & x^8 in the expansion $\left(2+\frac{x}{3}\right)^n$ are equal then n is equal to

A. 56

B. 15

C. 45

D. 55

Answer: D

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103. The term independent of x in $\left(\sqrt{\frac{x}{3}}+\sqrt{\frac{3}{2x^2}}\right)^{10}$ is

A. none

B. ^ $10C_1$

C. 5/12

D. 1

Answer: A

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104. The total number of terms in the expansion of $(x+y)^{100}+(x-y)^{100}$ after simplification is

A. 50

B. 51

C. 202

D. none of these

Answer: B

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105. The term independent of x in the expansion of $(1+x+2x^3)\left(\frac{3}{2}(x^2)-\frac{1}{3x}\right)^9$

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106. 5th term from the end in the expansion of $\left(\left(\frac{x^3}{2}\right)-\left(\frac{2}{x^2}\right)\right)^{12}$ is

A. $-7920x^{-4}$

B. $7920x^{-4}$

C. $7920x^4$

D. $-7920x^4$

Answer: B

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107. The coefficient of x^3 in the expansion of $\left(1-x+x^2\right)^5$ is

A. 10

B. 8

C. (-50)

D. (-30)

Answer: D

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108. The coefficient of x^4 in the expansion of $\left(1+x+x^2+x^3\right)^{11}$ is

A. 990

B. 605

C. 810

D. none of these

Answer: A

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109. The greatest term (numerically) in the expansion of $(3-5x)^{11}$ when x=1/5 is

A. 55×3^9

B. 46×3^9

C. 55×3^6

D. none of these

Answer: A

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110. Which of the following expression is divisible by 1225?

A. $6^{2n} - 35n - 1$

B. $6^{2n} - 35n + 1$

C. $6^{2n} - 35n$

D. $6^{2n} - 35n + 2$

Answer: A

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111. The value of where $\hat{} \ nC_r$ is

A. $\begin{pmatrix} 30 \\ 10 \end{pmatrix}$

B. $\begin{pmatrix} 30 \\ 15 \end{pmatrix}$

C. $\begin{pmatrix} 60 \\ 30 \end{pmatrix}$

D. $\begin{pmatrix} 31 \\ 10 \end{pmatrix}$

Answer: A

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112. If the sum of odd numbered terms and the sum of even numbered terms in the expansion of $(x+a)^n$ are A and B respectively . Then the value of $\left(x^2-a^2\right)^n$ is

A. 4AB

B. A^2-B^2

C. $A^2 + B^2$

D. none of these

Answer: B

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113. If $P(n) = 2 + 4 + 6 + \ldots\ldots + 2n \quad n \in N$ then $P(k) = k(k+1)$ $\Rightarrow P(k+1) = (k+1)(k+2)$ for all $k \in N$. So we can conclude that $P(n) = n(n+1)$ for:

A. All$n \in N$

B. $n > 1$

C. $n > 2$

D. Nothing can be said

Answer: D

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114. The value of the natural numbers n such that the inequality $2^n > 2n + 1$ is valid is :

A. For $n \geq 3$

B. For$n < 3$

C. For$n > 2$

D. For any n

Answer: A

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115. When P is a natural number then $p^{n+1} + (p+1)^{2n-1}$ is divisible by

A. P

B. $P^2 + P$

C. $P^2 + P + 1$

D. $P^2 - 1$

Answer: C

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116. Let P(n) denote the statement that $n^2 + n$ is odd. It is seen that $P(n) \Rightarrow P(n+1)$, P(n) is true for all

A. $n > 1$

B. n

C. $n > 2$

D. None of these

Answer: D

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117. For a positive integer n let a(n)=1+1/2+1/3+1/4+....+1/$((2^n)-1)$ Then

A. $a(100) \leq 100$

B. $a(100) > 100$

C. $a(200) \leq 100$

D. $a(200) \leq 100$

Answer: A::D

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118. Let $S(k) = 1 + 3 + 5 + \ldots\ldots + (2k-1) = 3 + k^2$ Then which of the following is true:

A. Principle of mathematical induction can be used to prove the formula

B. S(k)=S(k+1)

C. $S(k) = s(k+1)$

D. S(1) is correct

Answer: C

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119. Statement-1 for every natural number $n \geq 2$

$$\frac{1}{\sqrt{1}} + \frac{1}{\sqrt{2}} + \ldots\ldots + \frac{1}{\sqrt{n}} > \sqrt{n}$$

statement -2 for every natural number $n \geq 2\sqrt{n(n+1)} < n+1$

A. Statement-1 is true statement-2 is true: Statement-2 is a correct explanation of statement-1

B. Statement-1 is true statement-2 is true: Statement-2 is not a correct explanation of statement-1

C. Statement-1 is true , Statement-2 is false

D. Statement-1 is false , Statement-2 is true

Answer: B

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120. $(1+x)^n - nx - 1$ is divisible by $(wheren \in N)$

A. 2x

B. x^2

C. $2x^3$

D. All of these

Answer: B

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121. Statement-1 : $11^{25} + 12^{25}$ when divided by 23 leaves the remainder zero.

$a^n + b^n$ is always divisible by a+b $n \in N$

A. Statement-1 is true statement-2 is true: Statement-2 is a correct explanation of statement-1

B. Statement-1 is true statement-2 is true: Statement-2 is not a correct explanation of statement-1

C. Statement-1 is true , Statement-2 is false

D. Statement-1 is false , Statement-2 is true

Answer: C

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122. The coefficient of x^{53} in the expansion of $\sum_{m=0}^{100} \hat{} \ 100C_m(x-3)^{100-m}2^m$ is equal to

A. $\hat{} \ 100C_{47}$

B. $\hat{} \ 100C_{53}$

C. $-^{100}C_{53}$

D. $-^{100}C_{100}$

Answer: C

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123. The coefficient of y in the expansion of $\left(y^2+\left(\frac{c}{y}\right)\right)^5$ is

A. $10c^3$

B. $20c^2$

C. $10c$

D. 20c

Answer: A

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124. The term independent of x in $\left(x^2-\left(\frac{1}{x}\right)\right)^9$ is

A. 1

B. (-1)

C. 48

D. 84

Answer: D

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125. The coefficients of x^p and x^q in the expansion of $(1+x)^{p+q}$ are

A. equal

B. equal with opposite signs

C. reciprocal to each other

D. none of these

Answer: A

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126. If x^m occurs in the expansion of $\left(x+\left(\frac{1}{x^2}\right)\right)^{2n}$ then the coefficient of x^m is

A. $\frac{(2n)!}{\left(\left(\frac{2n-m}{3}\right)!\right)\left(\frac{4n+m}{3}\right)!}$

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

C. $(2n)!3!3\frac{!}{2n-m}!$

D. none of these

Answer: A

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127. Sum of the series

$$2C_0+\frac{C_1}{2}2^2+\frac{C_2}{3}2^3+\ldots\ldots\ldots+\frac{C_n}{n+1}2^{n+1}$$

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

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

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

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

Answer: B

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128. The value of $nC_0.^n C_n +^n C_1.^n C_{n-1} + + \ldots\ldots\ldots +^n C_n.^n C_0$

A. $\hat{} \; 2nC_{n-2}$

B. $\hat{} \; (2n-1)C_n$

C. $\hat{} \; (2n-1)C_{n-2}$

D. none of these

Answer: C

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129. If $(1+x)^{15} = C_0 + C_1 x + C_2 x^2 + \ldots\ldots\ldots + C_{15} x^{15}$ then $,^{15} C_0^2 - ^{15} C_1^2 + ^{15} C_2^2 - ^{15} C_3^2 + \ldots\ldots - ^{15} C_{15}^2$ is equal to

A. 0

B. 1

C. (-1)

D. none of these

Answer: A

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130. If $s_n = \sum_{r=0}^{n} \frac{1}{\hat{} \; nC_r}$ and $t_n = \sum_{r=0}^{n} \frac{r}{^nC_r}$ then $\frac{t_n}{s_n}$ is equal to

A. n-1

B. n/2-1

C. n/2

D. (2n-1)/2

Answer: C

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131. The fractional part of $=\frac{2^{4n}}{15}$ is

A. 1/15

B. 2/15

C. 4/15

D. none of these

Answer: A

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132. If the fourth term in the expansion of $\left(px+\left(\frac{1}{x}\right)\right)^n$ is independent of x then the value of term is

A. $5p^3$

B. $10p^3$

C. $20p^3$

D. none of these

Answer: C

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133. Find the coefficient of x^{20} in the expression of $\left(1+x^2\right)^{40}\left(x^2+2+\frac{1}{x^2}\right)^{-5}$.

A. ^ $(30)C_{10}$

B. ^ $(30)C_{25}$

C. 1

D. none of these

Answer: B

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134. Let n be a positive integer such that $\left(1+x+x^2\right)^n = a_0 + a_1 x + a_2 x^2 + \ldots\ldots + a_{2n} x^{2n}$ then $\sum_{r=0}^{2n} a_r$ is

A. 3^n

B. 3^{n-1}

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

D. none of these

Answer: A

Watch Video Solution

135. Let n be a positive integer such that $\left(1+x+x^2\right)^n = a_0 + a_1 x + a_2 x^2 + \ldots\ldots + a_{2n} x^{2n}$ then $\sum_{r=0}^{2n} a_r$ is

A. $a_{2n}, 0 \geq re2n$

B. $a_{2n-r}, 0 \leq r \leq 2n$

C. $a_{2n-r}, 0 \leq r \leq 2n$

D. none of these

Answer: B

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136. The greatest integer which divides the number $101^{100} - 1$ is

A. 100

B. 1000

C. 10000

D. 100000

Answer: C

Watch Video Solution

137. Coefficient of x^{11} in the expansion of $\left(1+3x+2x^2\right)^6$ is equal to

A. 288

B. 576

C. 384

D. none of these

Answer: B

Watch Video Solution

138. Show that $101^{50} > 99^{50} + 100^{50}$

A. $x > y$

B. 'xlty`

C. x=y

D. x=2y

Answer: B

Watch Video Solution

139. The greatest term (numerically) in the expansion of $(2 + 3x)^9$ when x=3/2 is

A. $\frac{5 \times 3^{11}}{2}$

B. $\frac{5 \times 3^{13}}{2}$

C. $\frac{7 \times 3^{13}}{2}$

D. none of these

Answer: C

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140. If $a > 0$ and coefficients of x^5 and x^{15} in the expansion of $\left(x^2 + \frac{a}{x^3}\right)^{10}$ are equal then a=

A. $\frac{1}{2+\sqrt{3}}$

B. $\frac{1}{2\sqrt{3}}$

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

D. 1

Answer: B

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

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

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

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

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

Answer: A

Watch Video Solution

142. The coefficients of x^n in $\left(1+\frac{x}{1!}+\frac{x^2}{2!}+\ldots\ldots+\frac{x^n}{n!}\right)^2$ is

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

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

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

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

Answer: A

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143. The sum of the coefficients of all the integral powers of x in the expansion of $\left(1+2\sqrt{x}\right)^{40}$ is

A. $3^{40}+1$

B. $3^{40}-1$

C. $\frac{1}{2}\left(3^{40}-1\right)$

D. $\frac{1}{2}\left(3^{40}+1\right)$

Answer: D

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144. The coefficient of x^m in $(1+x)^r+(1+x)^{r+1}+(1+x)^{r+2}+\ldots\ldots\ldots+(1+x)^n, r\leq m\leq n$ is

A. ^ $(n+1)C_{m+1}$

B. ^ $(n-1)C_{m-1}$

C. $\hat{} \; nC_m$

D. $\hat{} \; nC_{m+1}$

Answer: A

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145. The coefficient of $x^n y^n$ in the expansion of $\{(1+x)(1+y)(x+y)\}^n$ is

A. $\sum_{r=0}^{n} C_r^2$

B. $\sum (r=0)^n C_r^3$

C. $\sum_{r+s=0}^{n} \hat{} \; nC_r^n C_s^2$

D. none of these

Answer: B

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146. If $\log(1 - x + x^2) = a_1x + a_2x^2 + a_3x^3 + \ldots\ldots\ldots$ then $a_3 + a_6 + a_9 + \ldots\ldots\ldots$ is equal to

A. log2

B. 2/3 log2

C. 1/3 log2

D. 2log2

Answer: B

Watch Video Solution

147. The greatest term in the expansion of $(1 + x)^{10}$ when x=2/3 is

A. $210\left(\frac{2}{3}\right)^4$

B. $\left(\frac{2}{3}\right)^4$

C. $210\left(\frac{1}{3}\right)^4$

D. $210\left(\frac{2}{3}\right)^6$

Answer: A

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148. The number of integral terms in the expansion of $\left(3^{\frac{1}{2}}+2^{\frac{1}{2}}\right)^{500}$ is

A. 128

B. 129

C. 251

D. 512

Answer: C

Watch Video Solution

149. The least (positive) remainder when 17^{30} is divided by 5 is

A. 2

B. 1

C. 4

D. 3

Answer: C

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150. The coefficient of x^{17} in the expansion of (x-1)(x-2).....(x-18) is

A. 342

B. (-171)

C. 171/2

D. 684

Answer: B

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151. The number of terms in the expansion of $(a+b+c)^n$ where $n \in N$ is

A. ((n+1)(n+2))/2

B. n+1

C. n+2

D. (n+1)n

Answer: A

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152. The sum of the rational terms in the expansion of $\left(\sqrt{2}+3^{\frac{1}{5}}\right)^{10}$ is

A. 46

B. 42

C. 41

D. none of these

Answer: C

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153. The greatest coefficient iin the expansion of $(x+y+z+t)^{15}$ is

A. $\frac{15!}{3!(4!)^2}$

B. $\frac{15!}{3!(4!)}$

C. $\frac{5!}{3!(4!)^2}$

D. $\frac{15!}{3!(4!)^3}$

Answer: D

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154. If $(1+x)^n = \sum_{r=0}^{n} .^n C_r x^r$ then $\sum_{r=m}^{n} .^r C_m$ is equal to

A. $.^{n+1} C_m$

B. $.^{n+1}C_{m+1}$

C. $.^{n+2}C_{m+1}$

D. none of these

Answer: B

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155. Let n be a positive integer such that $(1+x+x^2)^n = a_0 + a_1x + a_2x^2 + \ldots\ldots + a_{2n}x^{2n}$ then $\sum_{r=0}^{2n} a_r$ is

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

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

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

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

Answer: A

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156. Give the integers $r > 1, n > 2$ and c0-efficients of $(3r)^t h$ and $(r+2)^{th}$ term in the binomial expansion of $(1+x)^{2n}$ are equal then

A. n=2r

B. n=3r

C. n=2r+1

D. none of these

Answer: A

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157. If $n \in I^+$ the value of $\sum_{k=1}^{n} k^3 \frac{\hat{} nC_k}{(\hat{} nC_{k-1})^2}$

A. $\frac{n(n+1)^2(n+2)}{12}$

B. (n(n+1)(n+2))/12

C. $\frac{n^2(n+1)(n+2)}{12}$

D. none of these

Answer: A

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158. In a triangle ABC the value of $\sum_{r=0}^{50} \hat{} (50)C_r a^r b^{50-r}$ cos(Rb-(50-r)A) is

A. c^{49}

B. $(a+b)^{50}$

C. $(2s-a-b)^{50}$

D. none of these

Answer: C

Watch Video Solution

159. The value of

$${}^{30}C_0.{}^{30}C_{10} + {}^{30}C_1.{}^{30}C_{11} + {}^{30}C_2.{}^{30}C_{12} + \ldots\ldots + {}^{30}C_{20}.{}^{30}C_{30}$$

A. , ${}^{60}C_{20}$

B. , ${}^{30}C_{10}$

C. , ${}^{60}C_{30}$

D. , ${}^{40}C_{30}$

Answer: B

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160. The number of distinct terms in the expansion of $\left(x^3 + 1 + \left(\frac{1}{x^3}\right)\right)$: ξnK^+ and $n \in N$ is

A. 2n

B. 3n

C. 2n+1

D. 3n+1

Answer: C

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161. The number of integral of integral terms in the expansion of $\left(17^{\frac{1}{3}}+35^{\frac{1}{2}}\right)^{600}$ is

A. 100

B. 50

C. 150

D. 101

Answer: D

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162. The expression $\left(x+\sqrt{x^3-1}\right)^7+\left(x-\sqrt{x^3-1}\right)^7$ is a polynomial of degree

A. 10

B. 9

C. 8

D. 7

Answer: A

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163. The coefficient of x^{50} in $(1+x)^{41}\left(1-x+x^2\right)^{40}$ is

A. 1

B. 2

C. 3

D. 0

Answer: D

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164. The coefficient of x^n in the expansion $(2x+3)^n-(2x+3)^{n-1}(5-2x)+(2x+3)^{n-2}(5-2x)^2+\ldots..$

A. 2^{n-3}

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

C. $(n+1)2^{n-3}$

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

Answer: B

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165. The coefficient of x^{65} in the expansion of $(1+x)^{131}\left(x^2-x+1\right)^{30}$ is

A. $\hat{}\ 130C_{65}+^{129}C_{66}$

B. $\hat{}\ 130C_{65}+^{129}C_{55}$

C. $\hat{}\ 130C_{66}+^{129}C_{65}$

D. none of these

Answer: D

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166. Remainder when 5^{40} is divided by 11.

A. 2

B. 3

C. 1

D. 0

Answer: C

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167. If $\left(1+x-2x^2\right)^6 = 1 + a_1x + a_2x^2 + \ldots\ldots + a_{12}x^{12}$ then

A. $a_2 + a_4 + a_6 + \ldots\ldots + a_{12} = 31$

B. $a_1 + a_3 + a_5 + \ldots\ldots + a_{11} = -32$

C. $a_1 + a_2 + a_3 + \ldots\ldots + a_{12} = -1$

D. none of these

Answer: A::B::C

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168. Number of values of r satisfying the equation $,^{69}C_{3r-1} - ^{69}C_{r^2} = ^{69}C_{r^2-1} - ^{69}C_{3r}$ is

A. 1

B. 2

C. 3

D. 7

Answer: C::D

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169. In the expansion of $\left(x+\left(\frac{a}{x^2}\right)\right)^n$, $(a \neq 0)$ if term independent of x does not exist then n must be

A. 20

B. 16

C. 15

D. 10

Answer: A::B::D

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170. If $f(n) = \sum_{r=1}^{n} [r(n^{n-1}C_{r-1} - r\text{^C_(r-1))+(2r+1) ^ } nC_r]$

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

B. $f(n) = (n+1)^2 - 1$

C. $\sum_{n=1}^{10} f(n) = 495$

D. $\sum_{n=1}^{10} f(n) = 374$

Answer: B::C

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171. The value of $,^{n} C_0 +^{n+1} C_1 +^{n+2} C_2 + \ldots\ldots +^{n+k} C_k$ is equal to

A. $,^{n+k+1} C_k$

B. $,^{n+k+1} C_{n+1}$

C. $,^{n+k}C_{n+1}$

D. none of these

Answer: A::B

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172. If the expansion of $\left(x+\left(\frac{\alpha}{x}\right)\right)^n$ and $\left(x+\left(\frac{\beta}{x^2}\right)\right)^n$ in powers of n have one term independent of x then n is divisible by

A. 2

B. 3

C. 1

D. none of these

Answer: A::B

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173. The coefficient of the middle term in the expansion of $(1+x)^{2n}$ is

A. $2^n C_n$

B. $\frac{1.3.5.\ldots.(2n-1)}{n!}$

C. 2.6....(4n-2)

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

Answer: B::D

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174. If the term independent of x in the expansion of `(sqrtx+(k/x^2))^10 is 405 then value of k must be

A. 3

B. (-3)

C. 9

D. (-9)

Answer: A::B

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175. If n is a positive integer then in the trinomial expansion of $\left(x^2+2x+2\right)^n$ coefficient is

A. x is $2^n.\ n$

B. x^2 is $n^2.2^{n-1}$

C. x^3 is $2^n.{}^{n+1}C_3$

D. All of these

Answer: A::B::C::D

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176. Which of the following will not be true?

A. The last two digits of 3^{100} will be 73

B. The last two digits of 3^{50} will be 51

C. The last two digits of 3^{50} will be 49

D. The last two digits of 3^{50} will be 249

Answer: C::D

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177. Consider following two infinite series in real r and 0

$$C = 1 + r\cos\theta + \frac{r^2\cos\theta}{2}! + r^3\frac{\cos(3\theta)}{3}! + \ldots..$$

$$S = r\sin\theta + \frac{r^2\sin 2\theta}{2}! + r^3\sin 3\frac{\theta}{3}! + \ldots..$$

If θ remains constant and r varies then

The expression CdC/dr+SdS/dr is equal to

A. $C^2 + S^2$

B. $\left(C^2 + S^2\right)\cos\theta$

C. $\left(C^2 + S^2\right)\sin^2\theta$

D. 1

Answer: B

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178. Consider following two infinite series in real r and 0

$$C = 1 + r\cos\theta + \frac{r^2\cos\theta}{2}! + r^3\frac{\cos(3\theta)}{3}! + \ldots..$$

$$S = r\sin\theta + \frac{r^2\sin 2\theta}{2}! + r^3\sin 3\frac{\theta}{3}! + \ldots..$$

If θ remains constant and r varies then

The expression CdS/dr-SdC/dr is equal to

A. $C^2 + S^2$

B. $\left(C^2 + S^2\right)\cos\theta$

C. $\left(C^2 + S^2\right)\sin^2\theta$

D. CS

Answer: C

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179. First three terms in the expansion of $(x+a)^n$ are respectively 128, 2240 and 16800

The value of $(a-x)^n$ is equal to

A. $(-3)^7$

B. 3^7

C. 7^7

D. none of these

Answer: B

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180. The sum of even terms in the expansion of $(x+a)^n$ is

A. $\frac{1}{2}\left(7^7+3^7\right)$

B. $\frac{1}{2}\left(7^7-3^7\right)$

C. $\frac{1}{4}\left(7^7+3^7\right)$

D. $\frac{1}{4}\left(7^7-3^7\right)$

Answer: A

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181. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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182. Match List-I with List-II

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183. If the second term of the expansion $\left[a^{\frac{1}{13}}+\left(\frac{a}{\sqrt{a^{-1}}}\right.\right.$ is14a^(5/2) and $thevalueof$(^nC_3)/("^nC_2) $=\lambda$ then λ is

Watch Video Solution

184.

$(1+x)\left(1+x+x^2\right)\left(1+x+x^2+x^3\right)\ldots\ldots\left(1+x+x^2+\ldots\ldots+x^{10}\right.$ when written in the ascending power of x then the highest exponent of x is $\lambda(1010)$ then λ is___

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185. The value of $\left\{\frac{3^{2003}}{28}\right\}=\frac{a}{b}$ where {} denotes the fractional part then (b-a) is equal to _____.

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186. The coefficient of x^4 in the expansion of $\left(1+x+x^2+x^3\right)^{11}$ is λ . Then the number of divisors of $\lambda$of the form 9k _____

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187. The fractional part of the sum of all the rational terms in the expansion of $\left(3^{\frac{1}{4}}+4^{\frac{1}{3}}\right)^{12}$ is _____

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188. Find the last three digits of $(17)^{256}$

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189. Find the term independent of x in the expansion of $\left[\left(t^{-1}-1\right)x+\left(t^{-1}+1\right)^{-1}x^{-1}\right]^8$

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190. If $a_k = \frac{1}{k(k+1)}$ for k=1 ,2.....,n then prove that $\left(\sum_{k=1}^{n} a_k\right)^2 = \frac{n^2}{(n+1)^2}$

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191. Find the unit digit in the number $17^{1995} + 11^{1995} - 7^{1995}$

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192. If $\left(\frac{1+x}{1-x}\right)^n = 1 + a_1 x + a_2 x^2 + \ldots\ldots + a_r x^r + \ldots\ldots$ then prove that $a_1 + a_2 + a_3 = \frac{4n^3 + 6n^2 + 8n}{3}$

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193. Prove that $\hat{} \; nC_0{}^{2n}C_n - {}^{n}C_1^{2n-2}C_n + {}^{n}C_2^{2n-4}C_n = 2^n$

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194. $If(1+x)^n = a_0 + a_1x + a_2x^2 + \ldots\ldots + a_nx^n$ then prove that $\left(1+\left(\frac{a}{a_0}\right)\right)\left(1+\frac{a_2}{a_1}\right) + \ldots\ldots\ldots\left(1+\frac{a_n}{a_{n-1}}\right) = \frac{(n+1)^n}{n!}$

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195. Prove that the following identity about binomial coefficients $\binom{n}{0} + \binom{n+1}{1} + \binom{n+2}{2} + \ldots\ldots\binom{n+r}{r} = \binom{n+r+1}{r}$

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196. The terms independent of x in $\left(\frac{3}{2}(x^2) - \frac{1}{3x}\right)^9$ is

A. T_5

B. T_6

C. T_7

D. None of these

Answer: C

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197. The 10^{th} term in the expansion of $\left(2x^2 + \frac{1}{x}\right)^{12}$ is

A. $\frac{1760}{x^3}$

B. $-\frac{1760}{x^3}$

C. $\frac{1760}{x^2}$

D. None of these

Answer: A

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198. If the 6th term in the expansion of $\left(\frac{1}{x^{8/3}} + x^2 \log_{10} x\right)^8$ is 5600, then x equals

A. 1

B. $\log_e 10$

C. 10

D. x does not exist

Answer: C

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199. The coefficient of x^5 in the expansion of $\left(x^2 - x - 2\right)^5$ is

A. -83

B. -82

C. -81

D. 0

Answer: C

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200. The sum of series ,$^{20}C_0 - {}^{20}C_1 + {}^{20}C_2 - {}^{20}C_3 + \ldots . + {}^{20}C_{10}$ is

A. $\left(\frac{1}{2}\right)^{20} C_{10}\Big)$

B. 0

C. ,$^{20}C_{10}$

D. , $-{}^{20}C_{10}$

Answer: A

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201. ^ $8C_2 +$ ^8C_3+ ^ $8C_4 +$ .... ^8C_7` is equal to

A. 2^8

B. $2^8 - 2$

C. $2^8 - 10$

D. None of these

Answer: C

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202. $.^{18}C_{15} + 2\left(.^{18}C_{16}\right) + ^{17}C_{16} + 1 = ^{n}C_3$, then n is equal to

A. 19

B. 20

C. 10

D. 24

Answer: B

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203. The value of $1^2 \cdot C_1 + 3^2 \cdot C_3 + 5^2 \cdot C_5 + ...$, is

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

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

C. $n(n+1)2^{n-3}$

D. None of these

Answer: C

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204. Let [x] denotes the greatest integer less then or equal to x. If $x = \left(\sqrt{3}+1\right)^5$, then [x] is equal to

A. 75

B. 50

C. 152

D. 151

Answer: C

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205. The fractional part of $=\frac{2^{4n}}{15}$ is

A. $\frac{15}{2}$

B. $\frac{15}{3}$

C. $\frac{15}{4}$

D. None of these

Answer: A

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206. If $p = \left(8 + 3\sqrt{7}\right)^n$ and f=p-[p], where [.] denotes the greatest integer function, then the value of p(1-f) is equal to

A. 1

B. 2

C. 2^n

D. 2^{2n}

Answer: A

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207. Maximum sum of coefficient in the expansion of $\left(1 - x\sin\theta + x^2\right)^n$ is

A. 1

B. 2^n

C. 3^n

D. 0

Answer: C

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208. If $n \in N$ then value of $S = \sum_{r=0}^{n} (-1)^r((\text{^nC\_r})/(\text{ ^ } (r+2)C_r))$ is

A. 1/n+2

B. n+2

C. 2/n+2

D. n+2/2

Answer: C

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209. The value of the expression $.^{47}C_4 + \sum_{j=1}^{5} .^{52-j}C_3$ is equal to

A. $\hat{} \ 47C_6$

B. $\hat{} \ 52C_5$

C. $\hat{} \ 52C_4$

D. None of these

Answer: C

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210. The sum of $1 + n\left(1 - \frac{1}{x}\right) + \frac{n(n+1)}{2!}\left(1 - \frac{1}{x}\right)^2 + \ldots . \infty$

A. x^n

B. x^{-n}

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

D. None of these

Answer: A

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211. Determine the coefficient of x^4 in the expansion of $\left(1+x+x^2+x^3\right)^n$.

A. ^ nC_4

B. ^ nC_4 + ^nC_2`

C. ^ nC_4 + ^nC_2+ ^ nC_4. ^nC_2`

D. ^ nC_4 + ^nC_2+ ^ nC_1. ^nC_2`

Answer: D

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212. If $a_n = \sum_{r=0}^{n} \frac{1}{}$^nC_r), $then$sum_(r=0)^nr/(^ nC_r) equals

A. $(n-1)a_n$

B. na_n

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

D. None of these

Answer: C

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213. The number of real negative terms in the binomial expansion of $(1+ix)^{4n-2}, n \in N, x > 0$ is

A. n

B. n+1

C. n-1

D. 2n

Answer: A

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214. Let $f(n) = 10^n + 3.\ 4^{n+2} + 5, n \in N$. The greatest integer which divides f(n) for all n is

A. 27

B. 9

C. 3

D. None of these

Answer: B

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215. The value of the sum of the series $3 \cdot$ ^nC_0+8cdot ˆ $nC_1 + 13 \cdot$ ^nC_2-18cdot ˆ $nC_3 +$ .... . upto (n+1) terms is

A. 0

B. 3^n

C. 5^n

D. None of these

Answer: A

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216. For natural numbers m, n if $(1-y)^m(1+y)^n = 1 + a_1y + a_2y^2 + \ldots.$ and $a_1 = a_2 = 10$ then (m, n) is

A. 45, 35

B. 35, 45

C. 20, 45

D. 35, 20

Answer: B

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217. The coefficient of the term independent of x in the expansion of $\left[\frac{(x+1)}{x^{2/3}-x^{1/3}+1}-\frac{(x-1)}{x-x^{1/2}}\right]^{10}$ is

A. 210

B. 105

C. 70

D. 4

Answer: A

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218. The coefficient of a^3b^4c in the expansion of $(1+a-b+c)^9$ is equal to

A. $\frac{9!}{3!6!}$

B. $\frac{9!}{4!5!}$

C. $\frac{9!}{3!5!}$

D. $\frac{9!}{3!4!}$

Answer: D

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219. The remainder when 9^{103} is divided by 25 is equal to

A. 5

B. 6

C. 4

D. None of these

Answer: C

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220. If $\left(3+x^{2008}+x^{2009}\right)^{2010}=a_0+a_1x^2+\ldots.+a_nx^n$, $a_0-\frac{1}{2}a_1-\frac{1}{2}a_2+a_3$ ..... is

A. 3^{2010}

B. 1

C. 2^{2010}

D. None of these

Answer: C

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221. The coefficient of x^ny^n in the expansion of $\{(1+x)(1+y)(x+y)\}^n$ is

A. $\sum_{r=0}^{n}$ (^nC_r)^2`

B. $\sum_{r=0}^{n}$ (^nC_(r+2))^2`

C. $\sum_{r=0}^{n}$ (^nC_(r+3))^2`

D. $\sum_{r=0}^{n}$ (^nC_r)^3`

Answer: D

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222. The remainder when $x = 5^{5^{5^{\cdots\cdots}}}$ (23 times 5) is divided by 24 is

A. 1

B. 3

C. 5

D. 23

Answer: C

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223. For integer $n > 1$, the digit at units place in the number $\sum_{r=0}^{100} r! + 2^{2^n}$ is

A. 0

B. 1

C. 2

D. None of these

Answer: A

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224. In the expansion of $\left(1 + x + x^2 + x^3\right)^6$, the coefficient of x^{14} is

A. 130

B. 120

C. 128

D. 125

Answer: B

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225. The coefficient of x^{3l+2} in the expression $(a+x)^l(b+x)^{l+1}(c+x)^{l+2}$ is

A. l(a+b+c)

B. l(a+b+c)+b+2c

C. l(a+b+c)+a+2b+3c

D. None of these

Answer: B

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226. The interval in which x must lie so that greatest term in the expansion of $(1+x)^{2n}$ has the greatest coefficient is

A. $\left(\frac{n-1}{n}, \frac{n}{n-1}\right)$

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

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

D. None of these

Answer: B

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227. The digit in the unit place in the number $(19)^{2005} + (11)^{2005} - (9)^{2005}$ is

A. 2

B. 1

C. 0

D. 8

Answer: B

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228. If $n < p < 2n$ and p is prime and N = $.^{2n}C_n$, then

A. p divides N

B. p^2 divides N

C. p cannot divide N

D. None of these

Answer: A

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229. If $|x| < \frac{2}{3}$ then the 4^{th} term in the expansion of $\left(1 + \frac{3}{2}x\right)^{\frac{1}{2}}$ is

A. $\frac{27}{128}x^3$

B. $-\frac{27}{128}x^3$

C. $\frac{81}{256}x^3$

D. None of these

Answer: A

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230. The sum of rational in $\left(\sqrt{2}+\sqrt[3]{3}+\sqrt[6]{5}\right)^{10}$ is equal to

A. 12632

B. 1260

C. 126

D. None of these

Answer: D

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231. Let $f(x) = a_0 + a_1 x + a_2 x^2 + \ldots . + a_n x^n + \ldots$and $\frac{f(x)}{1-x} = b_0 + b_1 x + b_2 x^2 + \ldots . + b_n x^n + \ldots$, then

A. $b_n + b_{n-1} = a_n$

B. $b_n - b_{n-1} = a_n$

C. $\frac{b_n}{b_{n-1}} = a_n$

D. None of these

Answer: B

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232. If $\left(1 - x^2\right)^n = \sum_{r=0}^{n} a_r x^r (1-x)^{2n-r}$, then a_r is equal to

A. ^ nC_r

B. ^ $nC_r 3^r$

C. $\hat{} (2n)C_r$

D. $\hat{} nC_r 2^r$

Answer: D

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233. The largest term in the expansion of $(3 + 2x)^{50}$, where x=1/5, is

A. 5th

B. 6th

C. 8th

D. None of these

Answer: C

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234. The sixth term in the expansion of $\left\{2^{\log_2 \sqrt[5]{9^{x-1}+7}} + \frac{1}{2^{\frac{1}{2}\log_2(3^{x-1}+1)}}\right\}^7$ is 84 when x=

A. 4

B. 3

C. 2 or 1

D. None of these

Answer: C

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235. The value of $\sum_{r=0}^{20} r(20-r)(\text{^(20)C\_r})\text{^2`}$ is equal to ?

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236. The value of $\sum_{r=1}^{n+1}\left(\sum_{k=1}^{n}\right.$ ^kC_(r-1))$(where r, k, n in N`)$ is equal to

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

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

C. 2^{n+1}

D. None of these

Answer: A

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237. $\sum_{r=0}^{300} a_r x^r = \left(1+x+x^2+x^3\right)^{100}$. If $a=\sum_{r=0}^{300} a_r$, then $\sum_{r=0}^{300} r a_r$ is equal to

A. 300a

B. 100a

C. 150a

D. 75a

Answer: C

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238. Coefficient of x^{50} in $(1+x)^{1000}+2x(1+x)^{999}+3x^2(1+x)^{998}+....+1001x^{1000}$ is

A. ^ $(1001)C_{50}$

B. ^ $(1000)C_{50}$

C. ^ $(1002)C_{50}$

D. ^ $(1002)C_{51}$

Answer: C

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239. $\frac{C_0}{2} - \frac{C_1}{3} + \frac{C_2}{4} - \frac{C_3}{5} + \ldots.$ is equal to

A. 1/n+1

B. 1/n(n+1)

C. 1/(n+1)(n+2)

D. None of these

Answer: C

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240. The coefficient of x^7 in the expansion of $\left(1 - x - x^2 + x^3\right)^6$ is

A. -132

B. -144

C. 132

D. 144

Answer: B

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241. Let $\left(1+x^2\right)^2(1+x)^n=\sum_{k=0}^{n+4} a_k x^k$.. If a_1, a_2 and a_3 aer in arithmetic progression, then the possible value/values of n is/are

A. 5

B. 4

C. 3

D. 2

Answer: B::C::D

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242. Coefficient of x^n in the expansion of $(1+x)^{2n}$ is

A. $,^{2n}C_n$

B. 2^n

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

D. $C_0^2 + C_1^2 + C_2^2 + ... + C_n^2$

Answer: A::C::D

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243. If $\left(1 + x + x^2\right)^n = a_0 + a_1 x + ... + a_{2n} x^{2n}$ then

A. $a_0 + a_1 + a_4 + ... = \frac{3^n + 1}{2}$

B. $a_0 - a_2 + a_4 - a_6 + ... = \cos\left(\frac{n\pi}{2}\right)$

C. $a_0 - a_2 + a_4 - a_6 + ... = \sin\left(\frac{n\pi}{2}\right)$

D. $a_1 - a_3 + a_5 - a_7 + ... = 0$ if n even

Answer: A::B::D

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244. The coefficients of x^7 in the expansion of $\left(x^3+3x+\frac{3}{x}+\frac{1}{x^3}\right)^5$ is

A. odd number

B. even number

C. , ${}^{15}C_4$

D. , ${}^{10}C_5$

Answer: A::C

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245. $3^{2n+2}-8n-9$ is divisible by

A. 8

B. 64

C. 16

D. 128

Answer: A::B::C

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246. If $\left(x+\frac{1}{x}+x^2+\frac{1}{x^2}\right)^{11}=a_0x^{-22}+a_1x^{-21}+\ldots..+a_{44}x^{22}$, then $a_0+a_2+a_4+\ldots+a_{44}$ is a multiple of

A. 2^{20}

B. 2^{21}

C. 2^{10}

D. 2^{11}

Answer: A::B::C

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247. If $\left(8+3\sqrt{7}\right)^n = P+F$, where P is an integer and F is a proper fraction, then

A. P is an odd integer

B. P is an even integer

C. $F \cdot (P+F) = 1$

D. (1-F)(P+F)=1

Answer: A::D

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248. Let $n = 3^{100}$, then for n

A. Unit's digit is 1

B. Ten's digit is 0

C. Unit's digit is 7

D. Ten's digit is 2

Answer: A::B

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249. Let $a_n = \frac{(1000)^n}{n!}$ for $n \in N$. Then a_n is greatest, when

A. n=998

B. n=999

C. n=1000

D. n=1001

Answer: B::C

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250. Which of the following is/are correct

A. $101^{50} - 99^{50} > 100^{50}$

B. 101^50-100^50 gt 99^50`

C. $(1000)^{1000} > (1001)^{999}$

D. $(1001)^{999} > (1000)^{1000}$

Answer: A::B::C

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251.

Answer the following question based on above passage:

The coefficient of x^{99} in the expansion of (x-1)(x-2).....(x-99)(x-100) is

A. -5050

B. 4950

C. -5000

D. None of these

Answer: A

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252.

Answer the following question based on above passage:

The coefficient of x^{99} in the expansion of (x-1)(x-2).....(x-99)(x-100) is

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253. Let $P = \sum_{r=1}^{50} (^(50+r)C_r(2r-1))/(\hat{}\ (50)C_r(50+r)\Big), Q = \sum_{r=1}^{50} ($ ^50C_r)^2, R=sum_(r=0)^(100)(-1)^r($\hat{}\ (100)C_r\big)^2$

Answer the following question based on above passage:

The value of P-Q is equal to

A. 1

B. -1

C. 2^{50}

D. 2^{100}

Answer: B

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254. Let

$$P=\sum_{r=1}^{50}\frac{(50+r)C_r(2r-1)}{(50)C_r(50+r)}, Q=\sum_{r=1}^{50}(50C_r)^2, R=\sum_{r=0}^{100}(-1)^r(100C_r)^2$$

Answer the following question based on above passage:

The value of P-R is equal to

A. 1

B. -1

C. 2^{50}

D. 2^{100}

Answer: B

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255. In reference to the expansion $(1+x)^n = \sum_{r=0}^{n} C_r x^r, n \in N$, match the series given in List-I with their sums given in List-II

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256. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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257. Match List - I with List-II

List - I		List - II	
(1)	Circular plate is expanded by heat from radius 5 cm to 5.06 cm. Approximate increase in area is	(P)	4
(2)	If an edge of a cube increases by 1%, then percentage increase in volume is	(Q)	0.6π
(3)	If the rate of decrease of $\frac{x^2}{2}-2x+5$ is twice the rate of decrease of x, then x is equal to (rate of decreases is non-zero)	(R)	3
(4)	Rate of increase in area of equilateral triangle of side 15 cm, when each side is increasing at the rate of 0.1 cm/s, is	(S)	$\frac{3\sqrt{3}}{4}$

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258. If $6^{83}+8^{83}$ is divided by 49, then the sum of the digits of remainder is

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259. Given $\left(1-2x+5x^2-10x^3\right)(1+x)^n=1+a_1x+a_2x^2+....$ and that $a_1^2=2a_2$, then the value of n is

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260. The digit in the units place of the decimal representation of 7^{1000} is

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261. The remainder, if $1+2+2^2+2^3+....+2^{1999}$ in divided by 5 is

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262. The sum of possible values of x for which the fifth term in the expansion of $(1+x)^{11}$ is 24 times the third term is ?

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263. Find the coefficient of x^{24} in $\left(x^2+\frac{3a}{x}\right)^{15}$

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264. If in the expansion of $(1+x)^{43}$ the coefficient of $(2r+1)^{th}$ term in equal to the coefficient of $(r+2)^{th}$ term find r.

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265. The coefficient of the middle term of the expansion of $\left(1-2x+x^2\right)^n$ is

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266. Find the coefficient of x^4 in the expansion of $\left(1+x-2x^2\right)^7$

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267. If the coefficients of four consecutive terms in the expansion of $(1+x)^n$ are a_1, a_2, a_3 and a_4 respectively. then prove that `a_1/(a_1+a_2)+a_3/(a_3+a_4)=2a_2/(a_2+a_3).

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268. If $(1+x)^n = \sum_{r=0}^{n} C_r x^r$ prove that $\frac{2^2 C_0}{1.2} + \frac{2^3 C_1}{2.3} + ... + \frac{2^{n+2} C_n}{(n+1)(n+2)} = \frac{3^{n+2} - 2n - 5}{(n+1)(n+2)}$

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269. If p+q=1, then show that $\sum_{r=0}^{n} r^2 \hat{} nC_r p^r q^{n-r} = npq + n^2 p^2$

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270. Prove that $C_1 + C_5 + C_9 + \ldots. = \frac{1}{2}\left(2^{n-1} + 2^{n/2}\sin\left(\frac{n\pi}{4}\right)\right)$

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271. Prove that $C_1 + C_4 + C_7 + \ldots. = \frac{1}{3}\left[2^n - 2\cos\left(\frac{n+1}{3}\pi\right)\right]$

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272. Prove that

$(2nC_0)^2 - (2nC_1)^2 + (2nC_2)^2 + \ldots. + (2nC_2n)^2 = (-1)^n 2nC_n$

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273. The coefficient of x^9 in the expansion of $(1+x)(1+x^2)(1+x^3)\ldots.(1+x^{100})$ is

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274. The sum of coefficient of integral powers of x in the binomial expansion of $\left(1-2\sqrt{x}\right)^{50}$ is:

A. $\frac{1}{2}\left(3^{50}\right)$

B. $\frac{1}{2}\left(3^{50}-1\right)$

C. $\frac{1}{2}\left(2^{50}+1\right)$

D. $\frac{1}{2}\left(3^{50}+1\right)$

Answer: D

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275. Number of irrational terms in the binomial expansion of $\left(3^{1/5}+7^{1/3}\right)^{100}$ is

A. 94

B. 88

C. 93

D. 95

Answer: A

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276. Coefficient of x^{11} in the expansion of $\left(1+x^2\right)^4\left(1+x^3\right)^7\left(1+x^4\right)^{12}$ is

A. 1051

B. 1106

C. 1113

D. 1120

Answer: C

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277. Let $S = \frac{2}{1}$^nC_0+2^2/2 ^ $nC_1 + \frac{2^3}{3}$^nC_2+....+2^(n+1)/(n+1) ^ nC_n.

Then S equals

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

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

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

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

Answer: B

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278. The coefficient of x^3 in the infinite series expansion of $\frac{2}{(1-x)(2-x)}$, for $|x| < 1$, is

A. -0.0625

B. 15/8

C. -0.125

D. 15/16

Answer: B

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279. The value of sum (nC1)^2+(nC2)^2+$(nC_3)^2 + \ldots. + (\text{nCn})^2$` is

A. $\left({}^{2n}C_n\right)^2$

B. ^ $(2n)C_n$

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

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

Answer: D

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280. If the coefficient of x^8 in $\left(ax^2+\frac{1}{bx}\right)^{13}$ is equal to the coefficient of x^{-8} in $\left(ax-\frac{1}{bx^2}\right)^{13}$, then a and b will satisfy the relation

A. ab+1=0

B. ab=1

C. a=1-b

D. a+b=-1

Answer: A

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281. The coefficients of three consecutive terms of $(1+x)^{n+5}$ are in the ratio 5 : 10 : 14. Then n= _____

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282. The coefficient of the term independent of x in the expansion of $\left[\frac{(x+1)}{x^{2/3}-x^{1/3}+1}-\frac{(x-1)}{x-x^{1/2}}\right]^{10}$ is

A. 120

B. 4

C. 210

D. 310

Answer: C

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283. Let n be a positive even integer. The ratio of the largest coefficient and the 2^{th} largest coefficient in the expansion of $(1+x)^n$ is 11 : 10. Then the number of terms in the expansion of $(1+X)^n$ is

A. 20

B. 21

C. 10

D. 11

Answer: B

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284. The sum of the series $\frac{1}{1x2}$*(25)C0+1/(2x3) $\cdot 25C_1 + \frac{1}{3x4}$ *25C2+....+1/(26x27)*$25C_{25}$

A. $\frac{2^{27}-1}{26\times 27}$

B. $\frac{2^{27}-28}{26\times 27}$

C. $\frac{1}{2}\left(\frac{2^{27}-28}{26\times 27}\right)$

D. $\frac{2^{26}-1}{52}$

Answer: B

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285. If n is a possible integer, then $\left(\sqrt{3}+1\right)^{2n}-\left(\sqrt{3}-1\right)^{2n}$ is

A. an irrational number

B. an odd positive integer

C. an even positive integer

D. a rational number other than positive integers

Answer: A

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286. Let the coefficients of powers of x in the 2^{nd}, 3^{rd} and 4^{th} terms in the expansion of $(1+x)^n$, where n is a positive integer, be in arithmetic progression. Then the sum of the coefficients of odd powers of x in the expansion is

A. 32

B. 64

C. 128

D. 256

Answer: B

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287. The sum of the series $1+\left(\frac{1}{2}\right)^n C_1+\left(\frac{1}{3}\right)^n C_2+\ldots.+\left(\frac{1}{n+1}\right)^n C_n$ is equal to

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

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

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

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

Answer: A

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288. Let $(1+x)^{10} = \sum_{r=0}^{10} c_r x^r$ and $(1+x)^7 = \sum_{r=0}^{7} d_r x^r$. If $P = \sum_{r=0}^{5} c_{2r}$ and $Q = \sum_{r=0}^{3} d_{2r+1}$, then P/Q is equal to

A. 4

B. 8

C. 16

D. 32

Answer: B

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289. The coefficient of x^{10} in the expansion of $1+(1+x)+....+(1+x)^{20}$ is

A. ^ $19C_9$

B. ^ $20C_{10}$

C. $\hat{}\ 21C_{11}$

D. $\hat{}\ 22C_{12}$

Answer: C

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290. The coefficient of x^7 in the expansion of $\left(1-x-x^2+x^3\right)^6$ is

A. -132

B. -144

C. 132

D. 144

Answer: B

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291. The number $(101)^{100} - 1$ is divisible by

A. 10^4

B. 10^6

C. 10^8

D. 10^{12}

Answer: A

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292. If A and B are coefficients of x^n in the expansions of $(1+x)^{2n}$ and $(1+x)^{2n-1}$ respectively, then A/B is equal to

A. 4

B. 2

C. 9

D. 6

Answer: B

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293. If $n > 1$ is an integer and $x \neq 0$, then $(1+x)^n - nx - 1$ is divisible by

A. nx^3

B. n^3x

C. x

D. nx

Answer: C

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