MATHS

BOOKS - CENGAGE

BINOMIAL THEOREM

Solved Examples And Exercises

1. Prove that

$(2nC_0)^2 + (2nC_1)^2 + (2nC_2)^2 - + (2nC_{2n})^2 = (-1)^n 2nC_n.$

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2. Find the following sum: $\frac{1}{n!} + \frac{1}{2!(n-2)!} + \frac{1}{4!(n-4)!} + \dots$

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3. if the sum of coefficients in the expansion of $(x - 2y + 3z)^n$ is 128, then find the greatest coefficients in the expansion of $(1 + x)^n$.

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4. Find the sum of the coefficients in the expansion of $\left(1 + 2x + 3x^2 + nx^n\right)^2$.

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5. In the expansion of $(1 + x)^{50}$ the sum of the coefficients of the odd power of x is

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6. If the middle term in the binomial expansion of $\left(\frac{1}{x} + x \sin x\right)^{10}$ is equal to $\frac{63}{8}$, find the value of x.

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7. Prove that $1^2 + 2^2 + 3^2 + \ldots\ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$

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8. Find the sum $C_0 - C_2 + C_4 - C_6 +$, $where C_r = {}^6C_r = {}^nC_r$.

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9. Prove that $nC_0 + {}^nC_3 + {}^nC_6 + \; = \frac{1}{3}\left(2^n + 2\frac{\cos(n\pi)}{3}\right)$.

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10. Given that the 4th term in the expansion of $[2 + (3/8x)]^{10}$ has the maximum numerical value. Then find the range of value of x.

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11. Find the sum of coefficients in the expansion of $(x - 2y + 3z)^n$ is 128, then find the greatest coefficients in the expansion of $(1 + x)^n$.

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12. Find the greatest term in the expansion of $\sqrt{3}\left(1 + \frac{1}{\sqrt{3}}\right)^{20}$.

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13. In an A.P. of 99 terms, the sum of all the odd-numbered terms is 2550. Then find the sum of all the 99 terms of the A.P.

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14. Find the remainder when 27^{40} is divided by 12.

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15. In the expansion of $(1+x)^n$, 7th and 8th terms are equal. Find the value of $(7/x+6)^2$.

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16. Find the value of $\sum_{n=1}^{\infty} \frac{1}{2n-1}\left(\frac{1}{9^{n-1}}+\frac{1}{9^{2n-1}}\right)$

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17. Find the sum $\sum_{r=1}^{n} r^2 \frac{\hat{}\ nC_r}{\hat{}\ nC_{r-1}}$.

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18. Show that 9^n+1 - 8n - 9 is divisible by 64, whenever n is a positive interger.

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19. If the 3rd, 4th , 5th and 6th term in the expansion of $(x+\alpha)^n$ be, respectively, $a, b, candd,$ prove that $\frac{b^2-ac}{c^2-bd}=\frac{5a}{3c}$.

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20. Find the remainder when 27^{40} is divided by 12.

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21. Show that $5^{2x}-1$ is divisible by 24 for all $n \in N$.

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22. If $(2+\sqrt{3})^n=I+f,$ where I and n are positive integers and 0

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23. Find the degree of the polynomial $\frac{1}{\sqrt{4x+1}}\left\{\left(\frac{1+\sqrt{4x+1}}{2}\right)^7-\left(\frac{1-\sqrt{4x+1}}{2}\right)^7\right\}$

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24. If 9^7+7^9 is divisible b 2^n, then find the greatest value of $n, wheren \in N\cdot$

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25. Prove that $\sqrt{10}\left[\left(\sqrt{10}+1\right)^{100}-\left(\sqrt{10}-1\right)^{100}\right]$ is an even integer .

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26. Find the remainder when $9x^3-3x^2+x-5$ is divided by $x-\frac{2}{3}$

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27. Find the remainder when $1690^{2608} + 2608^{1690}$ is divided by 7.

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28. Find the value of $\{3^{2003}/28\}, where\{.\}$ denotes the fractional part.

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29. The remainder when 5^{99} is divided by 13 is

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30. Find the remainder when 2^{81} is divided by 17.

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31. Using Binomial theorem, prove that $6^n - 5n$ always leaves remainder 1 when divided by 25 for all positive interger n .

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32. The coefficient of the middle term in the expansion of $(x + 2y)^6$ is

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33. The coefficients of three consecutive terms in the expansion of $(1 + a)^n$ are are in the ratio 1: 7: 42 Find n.

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34. If the coefficients of r^{th}, $(r + 1)^{th}$ and $(r + 2)^{th}$ terms in the binomial expansion of $(1 + y)^m$ are in A.P., then m and r satisfy the equation

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35. $(C_0 + C_1)(C_1 + C_2)(C_2 + C_3)(C_3 + C_4)\ldots\ldots\ldots.(C_{n-1} + C_n) = \dfrac{C_0C_1C_2\ldots.C_{n-1}(n+1)^n}{n!}$

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36. If a_1, a_2, a_3, a_4 be the coefficient of four consecutive terms in the expansion of $(1+x)^n$, then prove that: $\dfrac{a_1}{a_1+a_2} + \dfrac{a_3}{a_3+a_4} = \dfrac{2a_2}{a_2+a_3}$.

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37. Find the sum of $\sum_{r=1}^{n} \dfrac{r^n C_r}{nC_{r-1}}$.

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38. The positive integer just greater than $(1+.0001)^{10000}$ is

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39. Find (i) the last digit, (ii) the last two digits, and (iii) the last three digits of 17^{256}.

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40. If $2^{x+1} = 3^{1-x}$ then find the value of x.

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41. By mathematical induction prove that 2^{3n}-1 is divisible by 7.

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42. If x is very large as compare to y, then prove that

$$\sqrt{\frac{x}{x+y}}\sqrt{\frac{x}{x-y}} = 1 + \frac{y^2}{2x^2}.$$

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43. The coefficient of x^n in the expansion of $\left(1 - 9x + 20x^2\right)^{-1}$ is

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44. Find the sum $1 - \frac{1}{8} + \frac{1}{8} \times \frac{3}{16} - \frac{1 \times 3 \times 5}{8 \times 16 \times 24} +$

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45. Show that $\sqrt{3}$=1+(1/3)+(1/3)*(3/6)+(1/3)*((3/6)*(5/9)+.......

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46. Assuming x to be so small that x^2 and higher power of x can be neglected, prove that $\frac{\left(1 + \frac{3x}{4}\right)^{-4}(16 - 3x)^{\frac{1}{2}}}{(8 + x)^{\frac{2}{3}}} = 1 - \left(\frac{305}{96}\right)x$

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47. Find the value of `sumsum_(0lt=i

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48. Find the condition for which the formula $(a+b)^m = a^m + ma^{m-1}b + \frac{m(m-1)}{1 \times 2}a^{m-2}b^2 +$ holds.

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49. Find the value of x, for which $1/\left(\sqrt{5+4x}\right)$ can be expanded as infinite series.

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50. Find the fourth term in the expansion of $(1-2x)^{3/2}$.

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51. Prove that $\hat{} \ nC_0^{2n}C_n -^n C_1^{2n-2}C_n +^n C_2^{2n-4}C_n \equiv 2^n.$

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52. Prove that $\hat{} \ nC_0^nC_0 -^{n+1} C_1^nC_1 +^{n+2} C_2^nC_2 \equiv (-1)^n.$

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

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54. If the sum of the coefficient in the expansion of $\left(\alpha^2x^2-2\alpha x+1\right)^{51}$ vanishes, then find the value ofα

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55. Prove that $\sum_{\alpha+\beta+\gamma=10} \frac{10!}{\alpha!\beta!\gamma!} = 3^{10}$.

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56. If $(1+x-2x^2)^{20} = a_0 + a_1x + a_2x^2 + a_3x^3 + \ldots + a_{40}x^{40}$, then find the value of $a_1 + a_3 + a_5 + \ldots + a_{39}$.

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57. Find the sum of the series $\hat{} \; 15C_0 +^{15} C_1 +^{15} C_2 + \; +^{15} C_7$.

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58. Find the sum $\sum_{k=0}^{10} \hat{} \; (20)C_k$.

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59. Find the sum of all the coefficients in the binomial expansion of $\left(x^2+x-3\right)^{319}$.

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60. If the sum of coefficient of first half terms in the expansion of $(x+y)^n is 256$, then find the greatest coefficient in the expansion.

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61. Find the value of $\sum_{p=1}^{n}\left(\sum_{m=p}^{n} \hat{} \; nC_m^m C_p\right)$. And hence, find the value of $(\lim)_{n\to\infty}\frac{1}{3^n}\sum_{p=1}^{n}\left(\sum_{m=p}^{n} \hat{} \; nC_m^m C_p\right)$.

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62. Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5.........(2n-1)}{n!}2^n x^n$, where n is a positive integer.

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63. If the middle term in the expansion of $(x^2+1/x)^n$ is $924x^6$, then find the value of n.

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64. The first three terms in the expansion of $(1+ax)^n (n \neq 0)$ are $1, 6x and 16x^2$. Then find the value of $a and n$.

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65. If x^4 occurs in the rth term in the expansion of $\left(x^4+\frac{1}{x^3}\right)^{15}$, then find the value of r.

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66. Find the constant term in the expansion of $(x - 1/x)^6$.

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67. If the coefficients of $(r-5)^t h$ and $(2r-1)^t h$ terms in the expansion of $(1+x)^{34}$ are equal, find r.

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68. In $\left(2^{\frac{1}{3}} + \frac{1}{3^{\frac{1}{3}}}\right)^n$ if the ratio of 7th term from the beginning to the 7th term from the end is 1/6, then find the value of n.

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69. If the coefficient of 4th term in the expansion of $(a+b)^n$ is 56, then n is

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70. Find the number of irrational terms in the expansion of $\left(5^{1/6}+2^{1/8}\right)^{100}$.

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71. If x^p occurs in the expansion of $\left(x^2+1/x\right)^{2n}$, prove that its coefficient is $\dfrac{(2n)!}{\left[\frac{1}{3}(4n-p)\right]!\left[\frac{1}{3}(2n+p)\right]!}$.

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

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

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74. If the number of terms in the expansion of $(x+y+z)^n$ are 36, then find the value of n.

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75. Find the coefficient of a^3b^4c in the expansion of $(1+a-b+c)^9$.

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

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77. Find the number of terms which are free from radical signs in the expansion of $\left(x^{1/5} + y^{1/10}\right)^{55}$.

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

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79. Find the coefficient of x^{13} in the expansion of $(1 - x)^5 \times \left(1 + x + x^2 + x^3\right)^4$.

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80. Find the sum $\hat{}\ 10C_1 +^{10} C_3 +^{10} C_5 +^{10} C_7 +^{10} C_9$.

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81. Find the sum of $\frac{1}{1!(n-1)!}+\frac{1}{3!(n-3)}+\frac{1}{5!(n-5)}+,$

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82. If n is an even positive integer, then find the value of x if the greatest term in the expansion of $(1+x)^n$ may have the greatest coefficient also.

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83. If $|x|<1,$ then find the coefficient of x^n in the expansion of $\left(1+2x+3x^2+4x^3+\right)^{1/2}.$

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84. If $(r+1)th$ term is the first negative term in the expansion of $(1+x)^{7/2},$ then find the value of $r\cdot$

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85. If $|x| < 1$, then find the coefficient of x^n in the expansion of $\left(1 + x + x^2 + x^3 + \dots\right)^2$.

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86. Find the cube root of 217, correct to two decimal places.

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87. Find the coefficient of $x^2 \in \left(\frac{a}{a+x}\right)^{1/2} + \left(\frac{a}{a-x}\right)^{1/2}$

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88. If the third term in the expansion of $(1+x)^m is - \frac{1}{8}x^2$, then find the value of $m\cdot$

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89. Prove that $1 -^{n} C_1 \frac{1+x}{1+nx} +^{n} C_2 \frac{1+2x}{(1+nx)^2} -^{n} C_3 \frac{1+3x}{(1+nx)^3} + .$ $\ldots\ldots(n+1)terms = 0$

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

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91. Find the coefficient of x^{50} in the expansion of $(1+x)^{101} \times \left(1 - x + x^2\right)^{100}$.

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92. Find the term independent of x in the expansion of $\left(1 + x + 2x^3\right)\left[\left(3x^2/2\right) - (1/3x)\right]^9$

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93. If a and b are distinct integers, prove that a-b is a factor of a^n - b^n , whenever n is a positive integer.

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94. Find a,b,and n in the expansion of $(a+b)^n$ if the first three terms of the expansion are 729. 7290 and 30375, respectively.

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95. Find the coefficient of x^{25} in expansion of expression $\sum_{r=0}^{50} \hat{} (50)C_r(2x-3)^r(2-x)^{50-r}$.

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96. If the sum of the coefficients of the first, second, and third terms of the expansion of $\left(x^2 + \frac{1}{x}\right)^m is 46,$ then find the coefficient of the term that does not contain x.

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97. 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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98. If $(18x^2 + 12x + 4)^n = a_0 + a_{1x} + a2x2 + \; + a_{2n} x^{2n},$ prove that $a_r = 2^n 3^r \left(\hat{} \, (2n) C_r +^n C_1^{2n-2} C_r +^n C_2^{2n-4} C_r + \right).$

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99. Prove that $\hat{} \, m C_1^n C_m -^m C_2^{2n} C_m +^m C_3^{3n} C_m \equiv (-1)^{m-1} n^m.$

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100. Prove that

$^{n}C_0^{2n}C_n -^{n} C_1^{2n-1}C_n +^{n} C_2 \times^{2n-2} C_n + \ + (-1)^n \hat{} \ nC_n^n C_n = 1.$

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101. Find the sum $\sum_{r=0}^{n} \hat{} \ (n+r)C_r$.

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102. Find the $\sum\sum_{0 \leq i < j \leq n} 1.$

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103. Find the value of $\sum\sum_{1 \leq i \leq j \leq n-1} (ij)^n c_i^n c_j.$

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104. Find the value of `sumsum_(0lt=i

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105. Find the sum $\sum\sum_{0 \leq i < j \leq n} {}^{n}C_{i}{}^{n}C_{j}$

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106. Prove that $\sum_{r=0}^{s}\sum_{s=1}^{n} \hat{}\ nC_{s}^{s}C_{r} = 3^{n} - 1.$

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107. Find the sum $\sum\sum_{0 \leq i < j \leq n} {}^{n}C_{i}$

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108. The coefficient of x^4 in the expansion of $\left(\frac{x}{2}-\frac{3}{x^2}\right)^{10}$ is

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109. Find the term in $\left(3\sqrt{\frac{a}{\sqrt{b}}}+\sqrt{\frac{b}{3\sqrt{a}}}\right)^{21}$ which has the same power of aa n dbdot

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110. Using the binomial theorem, evaluate $(102)^5$.

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111. Find the 6th term in expansion of $\left(2x^2-1/3x^2\right)^{10}$.

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112. Find a if the 17^th and 18^th terms of the expansin $(2+a)^{50}$ are equal.

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113. Find n, if the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{2}+\frac{1}{\sqrt[4]{3}}\right)^n$ is $\sqrt{6}:1$.

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114. Simplify: $x^5+10x^4a+40x^3a^2+80x^2a^3+80xa^4+32a^5$.

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115. Find the value of

$$\frac{18^3+7^3+3\times18\times7\times25}{3^6+6\times243\times2+15\times18\times4+20\times27\times8+15\times9\times16+6\times3\times}$$

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116. Find an approximation of $(0.99)^5$ using the first three terms of its expansion.

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117. Find the sum $\sum_{i=0}^{r} .^{n_1} C_{r-i} .^{n_2} C_i$.

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118. Prove that $\sum_{r=0}^{2n} r\left(.^{2n} C_r\right)^2 = n^{4n} C_{2n}$.

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119. Prove that $\sum_{r=1}^{n} (-1)^{r-1}\left(1 + \frac{1}{2} + \frac{1}{3} + + \frac{1}{r}\right)^n C_r = \frac{1}{n}$.

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120. Prove that

$$\frac{C_1}{1} - \frac{C_2}{2} + \frac{C_3}{3} - \frac{C_4}{4} + + \frac{(-1)^{n-1}}{n} C_n = 1 + \frac{1}{2} + \frac{1}{3} + + \frac{1}{n}.$$

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121. Prove that $\sum_{r=0}^{n} \hat{} \, nC_r \sin rx \cos(n-r)x = 2^{n-1} \sin(nx)$.

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122. Find the last two digits of the number $(23)^{14}$.

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123. Find the last three digits of the number 27^{27}.

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124. Find the number of nonzero terms in the expansion of $\left(1+3\sqrt{2}x\right)^9+\left(1-3\sqrt{2}x\right)^9$.

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125. Find the value of $\left(\sqrt{2}+1\right)^6+\left(\sqrt{2}-1\right)^6$.

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126. Using binomial theorem (without using the formula for $\hat{}\ nC_r$), prove that

${}^nC_4+{}^mC_2-{}^mC_1^nC_2={}^mC_4-{}^{m+n}C_1^mC_3+{}^{m+n}C_2^mC_2-{}^{m+n}C_3^mC_1+{}^{m+}$

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127. Prove that

$(r+1)^nC_r-r^nC_r+(r-1)^nC_2-{}^nC_3++(-1)^r\ \hat{}\ nC_r=(-1)^r\ \hat{}\ (n$

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128. Find the sum $\hat{}\ nC_0 +^n C_4 +^n C_8 + \ldots\ldots$

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129. Find the value of $\hat{}\ 4nC_0 +^{4n} C_4 +^{4n} C_8 + \ + {}^{4n}C_{4n}$.

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130. If

$$\frac{1}{\sqrt{4x+1}}\left\{\left(\frac{1+\sqrt{4x+1}}{2}\right)^n - \left(\frac{1-\sqrt{4x+1}}{2}\right)^n\right\} = a_0 + a_1 x$$

then find the possible value of n.

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131. Find the coefficient of x^n in the polynomial $(x +^n C_0)(x + 3^n C_1) \times (x + 5^n C_2)\left[x + (2n+1)^n C_n\right]$.

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132. If $(1+x)^{15} = C_0 + C_1 x + C_2 x^2 + \quad + C_{15} x^{15}$, then find the value of $C_2 + 2C_3 + 3C_4 + \quad + 14C_{15}$.

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133. Prove that $\frac{\hat{}\, nC_0}{1} + \frac{\hat{}\, nC_2}{3} + \frac{\hat{}\, nC_4}{5} + \frac{\hat{}\, nC_6}{7} + \ldots. + \,=\, \frac{2^n}{n+1}$.

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134. Find the sum $\sum \sum_{0 \le i \le j \le n}^{n} C_i^n C_j$

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135. Find the sum $\sum\sum_{i\neq j}^{n} C_i^n C_j$

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136. Show that the integer next above $(\sqrt{3}+1)^{2m}$ contains 2^{m+1} as a factor.

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137. Prove that $\frac{1^2}{3}{}^nC_1+\frac{1^2+2^2}{5^n}C_2+\frac{1^1+2^2+3^2}{7^n}C_3+ + \frac{1^2+2^2+ \; +n^2}{(2n+1)^n}C_n=\frac{n(n+3)}{6}\cdot 2^{n-2}.$

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138. Prove that

$$\frac{\hat{\ } nC_0}{1}+\frac{\hat{\ } nC_2}{3}+\frac{\hat{\ } nC_4}{5}+\frac{\hat{\ } nC_6}{7}+\ldots.+ \doteq \frac{2^n}{n+1}.$$

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139. Find the sum $2C_0+\frac{2^2}{2}C_1+\frac{2^3}{3}C_2+\frac{2^4}{4}C_3+\ldots\ldots.+\frac{2^{11}}{11}C_{10}.$

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140. Find the value of

$$\frac{1}{81^n}-\frac{10}{(81^n)^{2n}}C_1+\frac{10^2}{(81^n)^{2n}}C_2-\frac{10^3}{(81^n)^{2n}}C_3++\frac{10^{2n}}{81^n}$$

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141. Find the value of

$$\hat{}\ 20C_0-\frac{\hat{}\ (20)C_1}{2}+\frac{\hat{}\ (20)C_2}{3}-\frac{\hat{}\ (20)C_3}{4}+.$$

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142. Find the sum $1C_0+2C_1+3C_2++(n+1)C_n, whereC_r=^n C_r.$

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143. If $\left(1+x+x^2+\quad+x^p\right)^n=a_0+a_1x+a_2x^2+\quad+a_{np}x^{np}$, then find the value of $a_1+2a_2+3a_3+\ddot{+}\,npa_{np}$.

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144. If $n>2$, then prove that $C_1(a-1)-C_2\times(a-2)+\quad+(-1)^{n-1}C_n(a-n)=a, whereC_r=^n C_r$

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145. Find the sum $1\times2\times C_1+2\times3C_2+$ $+n(n+1)C_n, whereC_r=^n C_r$.

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146. If $x+y=1,$ prove that $\sum_{r=0}^{n} r\cdot^{n} C_r x^r y^{n-r}=nx\cdot$

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147. Find the sum $3^n C_0-8^n C_1+13^n C_2-18^n C_3+\ldots$

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148. Prove that $\frac{.^n C_1}{2}+\frac{.^n C_3}{4}+\frac{.^n C_5}{6}+\ldots.=\frac{2^n-1}{n+1}.$

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149. If $(1+x)^n=\sum_{r=0}^{n} \hat{}\ nC_r$, show that $C_0+\frac{C_1}{2}++\frac{C_n}{n+1}=\frac{2^{n+1}-1}{n+1}.$

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150. If $\sum_{r=0}^{2n} a_r(x-2)^r = \sum_{r=0}^{2n} b_r(x-3)^r and a_k = 1$ for all $k \geq n$, then show that $b_n = {}^{2n+1}C_{n+1}$.

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151. Statement 1: $3^{2n+2} - 8n - 9$ is divisible by 64, $\forall n \in N$. Statement 2: $(1+x)^n - nx - 1$ is divisible by x^2, $\forall n \in N$.

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152. Statement 1: The number of distinct terms in $(1 + x + x^2 + x^3 + x^4)^{1000} is 4001$. Statement 2: The number of distinct terms in expansion $(a_1 + a_2 + \quad + a_m)^n is^{n+m-1}C_{m-1}$

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153. Statement1: if $n \in Nandn$ is not a multiple of 3 and $\left(1 + x + x^2\right)^n = \sum_{r=0}^{2n} a_r x^r$, then the value of $\sum_{r=0}^{n} (-1)^r a r^n C_r$ is zero

Statement 2: The coefficient of x^n in the expansion of $\left(1 - x^3\right)^n$ is zero, if $n = 3k + 1$ or $n = 3k + 2$.

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154. Statement 1:Three consecutive binomial coefficients are always in A.P.

Statement 2: Three consecutive binomial coefficients are not in H.P. or G.P.

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155. The value of $\binom{30}{0}\binom{30}{10} - \binom{30}{1}\binom{30}{11} + \binom{30}{2}\binom{30}{12} + \dots + \binom{30}{20}\binom{30}{30} =$

$\hat{}\ 60C20$ b. $\hat{}\ 30C10$ c. $\hat{}\ 60C30$ d. $\hat{}\ 40C30$

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156. If $f(x)=x^n, f(1)+\frac{f^1(1)}{1}+\frac{f^2(1)}{2!}+\frac{f^n(1)}{n!}, where f^r(x)$ denotes the rth order derivative of $f(x)$ with respect to x, is

A. a.n

B. b. 2^n

C. c. 2^{n-1}

D. d. none of these

Answer: null

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157. The fractional part of $\frac{2^{4n}}{15}$ is $(n \in N)$ (A) $\frac{1}{15}$ (B) $\frac{2}{15}$ (C) $\frac{4}{15}$ (D) none of these

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158. The value of $\hat{} \ 15C02 -^{15} C12 +^{15} C22 -^{15} C152$ is 15 b. -15 c. 0 d.

51

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159. If the sum of the coefficients in the expansion of $\left(1 - 3x + 10x^2\right)^n$ is a and the sum of the coefficients in the expansion of $\left(1 - x^2\right)^n$ is b, then

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160. If $\left(1 + x - 2x^2\right)^6 = 1 + a_1 x + a_2 x^2 + a_2 x^3 + \ldots\ldots\ldots,$ then the value of $a_2 + a_4 + a_6 + \ldots\ldots + a_{12}$ will be

A. (a) 32

B. (b) 31

C. (c) 64

D. (d) 1024

Answer: null

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161. Maximum sum of coefficient in the expansion of $\left(1-x\sin\theta+x^2\right)^n$ is 1 b. 2^n c. 3^n d. 0

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162. If the sum of the coefficients in the expansion of $(a+b)^n$ is 4096, then the greatest coefficient in the expansion is

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163. The number of distinct terms in the expansion of $\left(x+\frac{1}{x}+x^2+\frac{1}{x^2}\right)^{15}$ is/are (with respect to different power of x) 255 b. 61 c. 127 d. none of these

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164. The sum of the coefficients of even power of x in the expansion of $(1 + x + x^2 + x^3)^5$ is a.256 b. 128 c. 512 d. 64

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165. If the coefficient of x^7 in $\left[ax^2 + \left(\frac{1}{bx}\right)\right]^{11}$ equals the coefficient of x^{-7} in $\left[ax - \left(\frac{1}{bx^2}\right)\right]^{11}$, then a and b satisfy the relation

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166. If the coefficients of the $(2r + 4)th$, $(r - 2)th$ term in the expansion of $(1 + x)^{18}$ are equal, then the value of r is.

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167. If the coefficients of the rth, $(r+1)th, (r+2)th$ terms is the expansion of $(1+x)^{14}$ are in A.P, then the largest value of r is.

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168. If the three consecutive coefficients in the expansion of $(1+x)^n$ are 28, 56, and 70, then the value of n is.

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169. Degree of the polynomial $\left[\sqrt{x^2+1}+\sqrt{x^2-1}\right]^8+\left[\frac{2}{\sqrt{x^2+1}+\sqrt{x^2-1}}\right]^8$ is.

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170. Least positive integer just greater than $(1+0.00002)^{50000}$ is.

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171. If $U_n = (\sqrt{3}+1)^{2n} + (\sqrt{3}-1)^{2n}$, then prove that $U_{n+1} = 8U_n - 4U_{n-1}$.

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172. Prove that the coefficient of x^n in the expansion of $\frac{1}{(1-x)(1-2x)(1-3x)} is \frac{1}{2}(3^{n+2} - 2^{n+3} + 1)$.

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173. The value of $(30, 0)(30, 10) - (30, 1)(30, 11) + (30, 2)(30, 11) - \ldots\ldots\ldots\ldots + (30, 20)(3$

, where $(n, r) = nC_r$ is a. $(30, 10)$ b. $(30, 15)$ c. $(60, 30)$ d. $(31, 10)$

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174. If $n = 12m(m \in N)$, prove that

$$\hat{}\ nC_0 - \frac{\hat{}\ nC_2}{\left(2+\sqrt{3}\right)^2} + \frac{\hat{}\ nC_4}{\left(2+\sqrt{3}\right)^4} - \frac{\hat{}\ nC_6}{\left(2+\sqrt{3}\right)^6} + \ddot{=} \left(\frac{2\sqrt{2}}{1+\sqrt{3}}\right)^n.$$

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175. In the expansion of $(1+x)^n(1+y)^n(1+z)^n$, the sum of the co-efficients of the terms of degree 'r' is

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176. The sum of the series

$$\frac{.^{101}C_1}{.^{101}C_0} + \frac{2.\ .^{101}C_2}{.^{101}C_1} + \frac{3.\ .^{101}C_3}{.^{101}C_2} + \ldots.. + \frac{101.\ .^{101}C_{101}}{.^{101}C_{100}}$$ is ______.

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177. Prove that $\sum_{r=1}^{m-1} \frac{2r^2 - r(m-2) + 1}{(m-r)^m C_r} = m - \frac{1}{m}.$

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178. Find the coefficient of x^{50} in the expansion of $(1+x)^{101} \times (1-x+x^2)^{100}$.

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179. If $b_1, b_2 b_n$ are the nth roots of unity, then prove that $\hat{}\ nC_1 \dot{b}_1 +^n C_2 \dot{b}_2 + \ +^n C_n \dot{b}_n = \frac{b_1}{b_2}\{(1+b_2)^n - 1\}$.

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180. If $\hat{}\ n+1C_{r+1} :^n C_r :^{n-1} C_{r-1} = 11:6:3,$ then $nr =$

A. a.20

B. b. 30

C. c. 40

D. d. 50

Answer: null

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181. If the last tem in the binomial expansion of $\left(2^{\frac{1}{3}}-\frac{1}{\sqrt{2}}\right)^{n} is \left(\frac{1}{3^{\frac{5}{3}}}\right)^{\log_3 8}$, then 5th term from the beginning is 210 b. 420 c. 105 d. none of these

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182. Find the last two digits of the number $(23)^{14}$.

A. 01

B. 03

C. 09

D. None of these

Answer: null

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183. The value of x for which the sixth term in the expansion of

$$\left[2^{\log} - 2^{\sqrt{9^{(x-1)}+7}} + \frac{1}{2^{\frac{1}{5}}(\log)_2\left(3^{(x-1)}+1\right)}\right]^7$$ is 84 is

A. a.4

B. b. 1 or 2

C. c. 0 or 1

D. d. 3

Answer: null

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

A. a.1

B. b. $(\log)_e 10$

C. c. 10

D. d. x

Answer: null

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185. The total number of terms which are dependent on the value of x in the expansion of $\left(x^2 - 2 + \frac{1}{x^2}\right)^n$ is equal to

A. a.$2n + 1$

B. b. $2n$

C. c. n

D. d. $n+1$

Answer: null

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186. In the expansion of $\left(3^{-x/4}+3^{5x/4}\right)^{n}$ the sum of binomial coefficient is 64 and term with the greatest binomial coefficient exceeds the third by $(n-1)$, the value of x must be

A. a.0

B. b. 1

C. c. 2

D. d. 3

Answer: null

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187. If n is an integer between 0 and 21, then the minimum value of $n!(21-n)!$ is attained for $n=$ 1 b. 10 c. 12 d. 20

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188. If R is remainder when $6^{83}+8^{83}$ is divided by 49, then the value of $R/5$ is.

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189. Let a and b be the coefficients of x^3 in $(1+x+2x^2+3x^3)^4 and (1+x+2x^2+3x^3+4x^4)^4$, then respectively. Then the value of $4a/b$ is.

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190. Let $1+\sum_{r=1}^{10}\left(3^r \dot{10}C_r + r\dot{10}C_r\right) = 2^{10}\left(\alpha.\,4^5+\beta\right) where \alpha, \beta \in N$

and $f(x) = x^2 - 2x - k^2 + 1.$ If α, β lies between the roots of $f(x) = 0$, then find the smallest positive integral value of $k\cdot$

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191. Let $a = 3^{\frac{1}{223}} + 1$ and for all $t \geq 3$, let

$f(n) = ^n C_0 \dot{a}^{n-1} - ^n C_1 \dot{a}^{n-2} + ^n C_2 \dot{a}^{n-3} - + (-1)^{n-1} \hat{\dot{}}\, nC_{n-1}\dot{a}^0$.

If the value of $f(2007) + f(2008) = 3^k where k \in N,$ then the value of k is.

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192. If the constant term in the binomial expansion of $\left(x^2 - \frac{1}{x}\right)^n, n \in N$ is 15, then the value of n is equal to.

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193. The largest value of x for which the fourth tem in the expansion

$$\left(5^{\left(\frac{2}{5}\right)(\log)_5\sqrt{4^x+44}}+\frac{1}{5^{\log_5\left(2^{(x-1)}+7\right)^{\frac{1}{3}}}}\right)^8$$ is 336 is.

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194. The number of values in set of values of r for which

$\hat{}\,(23)C_r+2.^{23}C_{r+1}+^{23}C_{r+2}\geq^{25}C_{15}$ is

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195. If the second term of the expansion $\left[a^{\frac{1}{13}}+\frac{a}{\sqrt{a^{-1}}}\right]^n$ is $14a^{5/2}$, then the value of $\frac{\hat{}\,nC_3}{\hat{}\,nC_2}$ is.

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196. Given $(1-2x+5x^2-10x^3)(1+x)^n = 1+a_1x+a_2x^2+$ and that$a12 = 2a_2$ then the value of n is.

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197. Sum of last three digits of the number $N = 7^{100} - 3^{100}$ is.

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198. Let n be a positive integer and $(1+x+x^2)^n = a_0 + a_1x + \quad + a^{2n}x^{2n}.$ Show that $a_0^2 - a_1^2 + a_2^2 + \quad + 'a_2n'x^2 = a_n.$

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199. Prove that $\sum_{r=1}^{k} (-3)^{r-1 3n}C_{2r-1} = 0, wherek = 3n/2$ and$n$ is an even integer.

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200. The coefficient of the middle term in the binomial expansion in powers of x of $(1+\alpha x)^4$ and of $(1-\alpha x)^6$ is the same if α equals

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201. If in the expansion of $(1+x)^n, a, b, c$ are three consecutive coefficients, then $n = \dfrac{ac+ab+bc}{b^2+ac}$ b. $\dfrac{2ac+ab+bc}{b^2-ac}$ c. $\dfrac{ab+ac}{b^2-ac}$ d. none of these

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202. Prove that $\sum_{k=1}^{n} \dfrac{1}{k(k+1)} = 1 - \dfrac{1}{n+1}$.

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203. Prove that $(25)^{n+1} - 24n + 5735$ is divisible by $(24)^2$ for all $n = 1, 2,$

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204. The coefficient of $1/x$ in the expansion of $(1+x)^n(1+1/x)^n$ is $\frac{n!}{(n-1)!(n+1)!}$ b. $\frac{(2n)!}{(n-1)!(n+1)!}$ c. $\frac{(2n)!}{(2n-1)!(2n+1)!}$ d. none of these

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205. The coefficient x^5 in the expansion of $(1+x)^{21} + (1+x)^{22} + \; + (1+x)^{30}$ is a. ${}^{51}C_5$ b. ${}^{9}C_5$ c. ${}^{31}C_6 - {}^{21}C_6$ d. ${}^{30}C_5 + {}^{20}C_5$

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206. If x^m occurs in the expansion $\left(x+1/x^2\right)^2 n$ then the coefficient of x^m is $\frac{(2n)!}{(m)!(2n-m)!}$ b. $\frac{(2n)!3!3!}{(2n-m)!}$ c. $\frac{(2n)!}{\left(\frac{2n-m}{3}\right)!\left(\frac{4n+m}{3}\right)!}$ d. none of these

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207. If the coefficients of 5th, 6th , and 7th terms in the expansion of $(1+x)^n$ are in A.P., then $n=$ a. 7 only b. 14 only c. 7 or 14 d. none of these

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208. If $\left(1+2x+x^2\right)^n=\sum_{r=0}^{2n} a_r x^r, thena=$ $\left(\hat{\ } nC_2\right)^2$ b. $\hat{\ } nC_r \,\hat{\cdot}\, nC_{r+1}$ c. $\hat{\ } 2nC_r$ d. $\hat{\ } 2nC_{r+1}$

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209. In the expansion of $\left(x^3 - \frac{1}{x^2}\right)^n$, $n \in N$ if sum of the coefficients of x^5 and x^{10} is 0 then n is

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210. If the coefficients of rth and $(r+1)th$ terms in the expansion of $(3+7x)^{29}$ are equal, then r equals a. 15 b. 21 c. 14 d. none of these

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211. In the expansion of $\left(1+3x+2x^2\right)^6$, the coefficient of x^{11} is a. 144 b. 288 c. 216 d. 576

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212. If $n-1C_r = \left(k^2-3\right)^n C_{r+1}$, then (a) $(-\infty, -2]$ (b) $[2, \infty)$ (c) $\left[-\sqrt{3}, \sqrt{3}\right]$ (d) $\left(\sqrt{3}, 2\right]$

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213. Prove that $\frac{3!}{2(n+3)} = \sum_{r=0}^{n} (-1)^r \left(\frac{\hat{}\ nC_r}{\hat{}\ (r+3)C_r} \right)$

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

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215. The expression $\left(x + \frac{(x^3-1)^{\frac{1}{2}}}{2}\right)^5 + \left(x - \frac{(x^3-1)^{\frac{1}{2}}}{2}\right)^5$ is a polynomial of degree a. 5 b. 6 c. 7 d. 8

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216. The roots of the equation are | x C r x+1 C r x+2 C r n−1 C r n C r n+1 C r n−1 C r−1 n C r−1 n+1 C r−1 | =0 are a. x=n, b. x=n+1, c. x=n-1, d. x=n-2.

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217. In the binomial expansion of $(a-b)^n, n \geq 5$, the sum of 5^{th} and 6^{th} term $\frac{a}{b}$ equals

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218. 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 1051 b. 1106 c. 1113 d. 1120

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219. r and n are positive integers $r > 1, n > 2$ and coefficient of $(r+2)^{th}$ term and $3r^{th}$ term in the expansion of $(1+x)^{2n}$ are equal, then n equals

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220. The coefficient of x^4 in $\left(x/2 - 3/x^2\right)^{10}$ is $\frac{405}{256}$ b. $\frac{504}{259}$ c. $\frac{450}{263}$ d. none of these

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221. If C_r stands for nC_r, then the sum of the series $\frac{2\left(\frac{n}{2}\right)!\left(\frac{n}{2}\right)!}{n!}\left[C_0^2 - 2C_1^2 + 3C_2^2 - \ldots\ldots. + (-1)^n(n+1)C_n^2\right]$,where n is an even positive integer, is

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222. The sum $\sum_{i=0}^{m}\binom{10}{i}\binom{20}{m-1}$, where $\binom{p}{q}=0$ if $p<q$, is maximum when m is equal to (A) 5 (B) 10 (C) 15 (D) 20

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223. The coefficient of X^{24}in the expansion of $\left(1+X^2\right)^{12}\left(1+X^{12}\right)\left(1+X^{24}\right)$

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224. The term independent of a in the expansion of $\left(1+\sqrt{a}+\frac{1}{\sqrt{a}-1}\right)^{-30}$ is (a) $30C_{20}$ (b) 0 (c) $30C_{10}$ (d) non of these

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225. The coefficient of x^{53} in the expansion $\sum_{m=0}^{100} \hat{}\ 100C_m(x-3)^{100-m}2^m$ is (a) $100C_{47}$ (b.) $100C_{53}$ (c.) $-100C_{53}$ (d.) none of these

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226. The coefficient of the term independent of x in the exampansion of $\left(\frac{x+1}{x^{2/3}-x^{1/3}+1}-\frac{x-1}{x-x^{1/2}}\right)^{10}$ is 210 b. 105 c. 70 d. 112

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227. In the expansion of $(1+x+x^3+x^4)^{10}$, the coefficient of x^4 is $\hat{}\ 40C_4$ b. $\hat{}\ 10C_4$ c. 210 d. 310

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228. If coefficient of $a^2b^3c^4 \in (a+b+c)^m$ (where $n \in N$) is $L(L \neq 0)$, then in same expansion coefficient of $a^4b^4c^1$ will be (A) L (B) $\frac{L}{3}$ (C) $\frac{mL}{4}$ (D) $\frac{L}{2}$

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229. The last two digits of the number 3^{400} are (A) 81 (B) 43 (C) 29 (D) 01

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230. The expression $\left(\sqrt{2x^2+1}+\sqrt{2x^2-1}\right)^6+\left(\frac{2}{\left(\sqrt{2x^2+1}+\sqrt{2x^2-1}\right)^{\square}}\right)^6$ is polynomial of degree 6 b. 8 c. 10 d. 12

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231. The coefficient of $x^r[0 \leq r \leq (n-1)]$ in lthe expansion of $(x+3)^{n-1}+(x+3)^{n-2}(x+2)+(x+3)^{n-3}(x+2)^2+\ +(x+2)^{n-1}$ is $\hat{\ } nC_r(3^r-2^n)$ b. $\hat{\ } nC_r\left(3^{n-r}-2^{n-r}\right)$ c. $\hat{\ } nC_r\left(3^r+2^{n-r}\right)$ d. none of these

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232. If $\left(1+2x+3x^2\right)^{10}=a_0+a_1x+a_2x^2+\ +a_{20}x^{20}, thena_1$ equals 10 b. 20 c. 210 d. none of these

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233. In the expansion of $\left(5^{1/2}+7^{1/8}\right)^{1024}$, the number of integral terms is 128 b. 129 c. 130 d. 131

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234. For which of the following values of x, $5th$ term is the numerically greatest term in the expansion of $(1 + x/3)^{10}$, a. -2 b. 1.8 c. 2 d. -1.9

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235. For natural numbers $m, n,$ if $(1 - y)^m (1 + y)^n = 1 + a_1 y + a_2 y^2 + , and a_1 = a_2 = 10, then$

`m nc. m+n=80$d$. m-n=20`

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236. If the middle term in the expansion of $\left(\frac{x}{2} + 2\right)^8$ is 1120, then the sum of possible real values of x is.

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237. If

$(1+x)^n = C_0 + C_1 x + C2x2 + \quad + C_n x^n, then' C_0 - (C_0 + C_1 + \,) + (C_0$

is

A. a. even integer

B. b. a positive value

C. c.a negative value divisible by2^{n-1}

D. d.divisible by2^n

Answer: null

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238. In the expansion of $\left(x^2+1+\frac{1}{x^2}\right)^n, n \in N,$ (a)number of terms is$2n+1$ (b)coefficient of constant terms is 2^{n-1} (c)coefficient of $x^{2n-1} isn$ (d)coefficient of x^2 in n

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239. The value of $\hat{} nC_1 +^{n+1} C_2 +^{n+2} C_3 + \; +^{n+m-1} C_m$ is equal to

(a) $\hat{} \; m + nC_{n-1}$ (b) $\hat{} \; m + nC_{n-1}$ (c) $\hat{} \; mC_1 +^{m+1} C_2 +^{m+2} C_3 + \; +^{m+n-1}$ (d) $\hat{} \; m + 1C_{m-1}$

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240. If $(1+x)^n = C_0 + C_1 x + C2x2 + \; + C_n x^n, n \in N, thenC_0 - C_1 + C_2 - \; +$

is equal to $(m < n)$

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241. The 10th term of $\left(3 - \sqrt{\frac{17}{4} + 3\sqrt{2}}\right)^{20}$ is (a)a irrational number (b)a rational number (c)a positive integer (d)a negative integer

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242. For the expansion $\left(x\sin p + x^{-1}\cos p\right)^{10}, (p \in R)$, The greatest value of the term independent of x is $(a)10!/2^5(5!)^2$ (b)the least value of sum of coefficient is zero (c)the greatest value of sum of coefficient is 32 (d)the least value of the term independent of x occurs when $p = (2n+1)\frac{\pi}{4}, n \in Z$

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243. Let $\left(1+x^2\right)^2(1+x)^n = \sum_{k=0}^{n+4} a_k x^k \dot{I} f a_1, a_2 and a_3$ are in arithmetic progression, then the possible value/values of n is/are a. 5 b. 4 c. 3 d. 2

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244. The middle term in the expansion of $(x/2+2)^8$ is 1120, then $x \in R$ is equal to a. -2 b. 3 c. -3 d. 2

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245. 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.) $\hat{\ } nC_r$ b.) $\hat{\ } nC_r 3^r$ c.) $\hat{\ } 2nC_r$ d.) $\hat{\ } nC_r 2^r$

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246.

$\left[\left(\hat{\ } nC_0 +^n C_3 + \right)1/2\left(\hat{\ } nC_1 +^n C_2 +^n C_4 +^n C_5\right]^2 + 3/4\left(\hat{\ } nC_1 -^n C_2\right.$

3 b. 4 c. 2 d. 1

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247. If $\sum_{r=0}^{10}\left(\frac{r+2}{r+1}\right) .^n C_r = \frac{2^8-1}{6}$, then n is (A) 8 (B) 4 (C) 6 (D) 5

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248. Let $f(x)=a_0+a_1x+a_2x^2+\ +a_nx^n+$ and $\frac{f(x)}{1-x}=b_0+b_1x+b_2x^2+\ +b_nx^n+$, then $b_n+b_{n-1}=a_n$ b.

$b_n - b_{n-1} = a_n$ c. $b_n / b_{n-1} = a_n$ d. none of these

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249. $\sum_{r=0}^{300} a_r x^r = \left(1 + x + x^2 + x^3\right)^{100}$. If $a = \sum_{r=0}^{300} a_r, then \sum_{r=0}^{300} ra_r$ is equal to $300a$ b. $100a$ c. $150a$ d. $75a$

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250. The value of $\sum_{r=1}^{n+1} \left(\sum_{k=1}^{n} {}^{k}C_{r-1}\right)$(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

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251. If $\frac{x^2 + x + 1}{1 - x} = a_0 + a_1 x + a_2 x^2 + , then \sum_{r=1}^{50} a_r$ is equal to 148 b. 146 c. 149 d. none of these

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252. p is a prime number and `n

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

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

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255. If

$(1-x)^{-n}=a_0+a_1x+a_2x^2+\ +a_rx^r+,thena_0+a_1+a_2+\ +a_r$

is equal to (a) $\frac{n(n+1)(n+2)(n+r)}{r!}$ (b) $\frac{(n+1)(n+2)(n+r)}{r!}$ (c) $\frac{n(n+1)(n+2)(n+r-1)}{r!}$ (d)none of these

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256. The value of $\sum_{r=0}^{20} r(20-r)\left(.^{20}C_r\right)^2$ is equal to

a. $400^{39}C_{20}$ b. $400^{40}C_{19}$ c. $400^{39}C_{19}$ d. $400^{38}C_{20}$

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257. The coefficient of x^{10} in the expansion of $\left(1+x^2-x^3\right)^8$ is 476 b. 496 c. 506 d. 528

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258. If the term independent of x in the $\left(\sqrt{x}-\frac{k}{x^2}\right)^{10}$ is 405, then k equals $2, \ -2$ b. $3, \ -3$ c. $4, \ -4$ d. $1, \ -1$

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259. The coefficient of x^2y^3 in the expansion of $(1-x+y)^{20}$ is $\frac{20!}{213!}$ b. $-\frac{20!}{213!}$ c. $\frac{20!}{15!2!3!}$ d. none of these

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260. The coefficient of x^5 in the expansion of $\left(x^2-x-2\right)^5$ is -83 b. -82 c. -86 d. -81

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261. The coefficient of $a^8b^4c^9d^9$ in $(abc+abd+acd+bcd)^{10}$ is $10!$ b. $\frac{10!}{8!4!9!9!}$ c. 2520 d. none of these

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262. If the coefficient of x^7 in $\left[ax^2 + \left(\frac{1}{bx}\right)\right]^{11}$ equals the coefficient of x^{-7} in $\left[ax - \left(\frac{1}{bx^2}\right)\right]^{11}$, then a and b satisfy the relation

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263. If $(1+x)^5 = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4 + a_5 x^5$, then the value of $(a_0 - a_2 + a_4)^2 + (a_1 - a_3 + a_5)^2$ is equal to 243 b. 32 c. 1 d. 2^{10}

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264. The coefficient of x^n in expansion of $(1+x)(1-x)^n$ is

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265. The coefficient of x^{28} in the expansion of $\left(1 + x^3 - x^6\right)^{30}$ is 1 b. 0 c. $30C_6$ d. $\hat{\ } 30C_3$

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266. The coefficient of x^n in $(1+x)^{101}\left(1-x+x^2\right)^{100}$ is nonzero, then n cannot be of the form $3r+1$ b. $3r$ c. $3r+2$ d. none of these

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267. Prove that $\sum_{r=0}^{n}(-1)^r \,\hat{}\; nC_r\left[\frac{1}{2^r}+\frac{3}{2^{2r}}+\frac{7}{2^{3r}}+\frac{15}{2^{4r}}+up \rightarrow mterms\right]=\frac{2^{mn}-}{2^{mn}(2^n-}$

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268. In the expansion of $\left(7^{1/3}+11^{1/9}\right)^{6561}$,

A. (a)there are exactly 730 rational term

B. (b)there are exactly 5831 irrational terms

C. (c)the term which involves greatest binomial coefficients is irrational

D. (d)the term which involves greatest binomial coefficients is rational

Answer: null

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269. If for z as real or complex,

$(1 + z^2 + z^4)^8 = C_0 + C1z2 + C2z4 + \ + C_{16}z^{32} then$ (a)

$C_0 - C_1 + C_2 - C_3 + \ + C_{16} = 1$ (b)

$C_0 + C_3 + C_6 + C_9 + C_{12} + C_{15} = 3^7$ (c)

$C_2 + C_5 + C_6 + C_{11} + C_{14} = 3^6$ (d)

$C_1 + C_4 + C_7 + C_{10} + C_{13} + C_{16} = 3^7$

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270. The sum of coefficient in the expansion of $\left(1+ax-2x^2\right)^n$ is (a)positive, when $a<1andn=2k, k\in N$ (b)negative, when $a<1andn=2k+1, k\in N$ (c)positive, when $a<1andn\in N$ (d)zero, when $a=1$

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271. If the 4th term in the expansion of $(ax+1/x)^n$ is 5/2, then (a) $a=\frac{1}{2}$ b. $n=8$ c. $a=\frac{2}{3}$ d. $n=6$

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272. Find the value (s) of r satisfying the equation $\hat{}\ 69C_{3r-1}-^{69}C_{r^2}=^{69}C_{r^2-1}-^{69}C_{3r}.$

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273. If $(4+\sqrt{15})^{n}=I+f, whren$ is an odd natural number, I is an integer and `0

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274. In the expansion of $(x+a)^{n}$ if the sum of odd terms is P and the sum of even terms is Q, then (a)$P^{2}-Q^{2}=(x^{2}-a^{2})^{n}$ (b) $4PQ=(x+a)^{2n}-(x-a)^{2n}$ (c) $2(P^{2}+Q^{2})=(x+a)^{2n}+(x-a)^{2n}$ (d)all of these

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275. If the coefficients of the rth, $(r+1)th, (r-2)th$ terms is the expansion of $(1+x)^{14}$ are in A.P, then the largest value of r is.

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276. The value of x in the expression $\left(x + x^{(\log)_{10}x}\right)^5$ if third term in the expansion is 10,00,000 is/are a. 10 b. 100 c. $10^{-5/2}$ d. $10^{-3/2}$

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277. Let $R = (5\sqrt{5} + 11)^{2n+1} and f = R - [R] where []$ denotes the greatest integer function, prove that $Rf = 4^{2n+1}$

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278. If $|x| < 1$, then find the coefficient of x^n in the expansion of $(1 + x + x^2 + x^3 + \dots)^2$.

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279. The coefficient of $x^5 \in (1 + 2x + 3x^2 + \dots)^{-3/2} is(|x| < 1)$ 21 b. 25 c. 26 d. none of these

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280. If x is so small that x^3 and higher power of x may neglected, then $\frac{(1+x)^{\frac{3}{2}}-\left(1+\frac{1}{2}x\right)^3}{(1-x)^{\frac{1}{2}}}$ may be approximated as

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281. If x is positive, the first negative term in the expansion of $(1+x)^{\frac{27}{5}}$ is

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282. Value of $\sum_{k=1}^{\infty}\sum_{r=0}^{k}\frac{1}{3^k}(\ ^kC_r)$ is $\frac{2}{3}$ b. $\frac{4}{3}$ c. 2 d. 1

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283. If the expansion in powers of x of the function $1/[(1-ax)(1-bx)]$ is a$a_0 + a_1x + a_2x^2 + a_3x^3 +$,then coefficient of x^n is $\frac{b^n - a^n}{b-a}$ b. $\frac{a^n - b^n}{b-a}$ c. $\frac{b^{n+1} - a^{n+1}}{b-a}$ d. $\frac{a^{n+1} - b^{n+1}}{b-a}$

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284. If $f(x) = 1 - x + x^2 - x^3 + \ldots + x^{15} + x^{16} - x^{17}$, then the coefficient of $x^2 \in f(x-1)$ is 826 b. 816 c. 822 d. none of these

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285. The sum of rational term in $\left(\sqrt{2} +^3 \sqrt{3} +^6 \sqrt{5}\right)^{10}$ is equal to 12632 b. 1260 c. 126 d. none of these

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286. The value of $\sum_{r=0}^{10}(r)^{20}C_r$ is equal to: a. $20\left(2^{18}+^{19}C_{10}\right)$ b. $10\left(2^{18}+^{19}C_{10}\right)$ c. $20\left(2^{18}+^{19}C_{11}\right)$ d. $10\left(2^{18}+^{19}C_{11}\right)$

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287. If $p=\left(8+3\sqrt{7}\right)^n andf=p-[p], where[.]$ 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}

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288. Statement 1: Greatest term in the expansion of $(1+x)^{12}, whenx=11/10$ is 7th Statement 2: 7th term in the expansion of $(1+x)^{12}$ has the factor $\hat{}\ 12C_6$ which is greatest value of $\hat{}\ 12C_r.$

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289. Statement 1: Remainder $when3456^{2222}$ is divided by 7 is 4. Statement 2: Remainder when 5^{2222} is divided by 7 is 4 $option1:$ BOTH the statement are TRUE and STATEMENT 2 is the correct explaination $option2:$ BOTH the statement are TRUE and STATEMENT 2 is NOT the correct explaination $option3:$ STATEMENT 1 is TRUE and STATEMENT 2 is FALSE $option4:$ STATEMENT 1 is FALSE and STATEMENT 2 is TRUE

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290. The value of x for which the sixth term in the expansion of

$$\left[2^{\log} - 2^{\sqrt{9^{(x-1)}+7}} + \frac{1}{2^{\frac{1}{5}}(\log)_2\left(3^{(x-1)}+1\right)}\right]^7$$ is 84 is

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291. The number $51^{49} + 51^{48} + 51^{47} + \ldots. + 51 + 1$ is divisible by a. 10 b. 20 c. 25 d. 50

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292. If $\sum_{r=0}^{n} \frac{r}{\hat{} \, nC_r} = \sum_{r=0}^{n} \frac{n^2 - 3n + 3}{2.^n C_r}$, then a.$n = 1$ b. $n = 2$ c. $n = 3$

d. none of these

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293. If $(1 + x)^n = C_0 + C_1 x + C_2 x^2 + \ldots\ldots + C_n x^n$, then show that the sum of the products of the coefficients taken two at a time, represented by $\sum \sum_{0 \le i < j \le n} {}^n c_i {}^n c_j$ is equal to $2^{2n-1} - \frac{(2n)!}{2(n!)^2}$

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294. For any positive integer (m,n) (with $n \ge m$), Let $\binom{n}{m} = .^n C_m$ Prove that

$$\binom{n}{m} + 2\binom{n-1}{m} + 3\binom{n-2}{m} + \ldots. + (n-m+1)\binom{m}{m}$$

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295. If $\sum_{r=0}^{n}\{a_r(x-\alpha+2)^r - b_r(\alpha - x - 1)^r\} = 0$, then prove that $b_n - (-1)^n a_n = 0$.

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296. Let $a = \left(2^{1/401} - 1\right)$ and for each $n \geq 2, let b_n = ^n C_1 + ^n C_2 \dot{a} + ^n C_3 a^2 + \ldots\ldots + ^n C_n \cdot a^{n-1}$. Find the value of $(b_{2006} - b_{2005})$.

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297. Prove that $\sum_{r=0}^{n} \hat{} \; nC_r(-1)^r\left[i^r + i^{2r} + i^{3r} + i^{4r}\right] = 2^n + 2^{\frac{n}{2}+1}\cos(n\pi/4), where i =$

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298. Find the coefficient of x^n in $\left(1 + \frac{x}{1!} + \frac{x^2}{2!} + + \frac{x^n}{n!}\right)^2$.

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299. If n is a positive integer, prove that $1-2n+\frac{2n(2n-1)}{2!}-\frac{2n(2n-1)(2n-2)}{3!}+\ +(-1)^{n-1}\frac{2n(2n-1)(}{(n-1}$

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300. Given, $s_n=1+q+q^2+\ldots..+q^n, S_n=1+\frac{q+1}{2}+\left(\frac{q+1}{2}\right)^2+\ldots+\left(\frac{q+}{2}\right.$ prove that ${}^{n+1}C_1+{}^{n+1}C_2s_1+{}^{n+1}C_3s_2+\ldots\ldots+{}^{n+1}C_{n+1}s_n=2^nS_n.$

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301. Show that $x^n=1+n\left(1-\frac{1}{x}\right)+\frac{n(n+1)}{1.2}\left(1-\frac{1}{x}\right)^2+\ldots$

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302. $\sum_{k=1}^{\infty} k\left(1-\frac{1}{n}\right)^{k-1}$ $=$ a.$n(n-1)$ b. $n(n+1)$ c. n^2 d. $(n+1)^2$

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303. The coefficient of x^4 in the expansion of $\left\{\sqrt{1+x^2}-x\right\}^{-1}$ in ascending powers of x, when $|x|<1, is\ 0$ b. $\frac{1}{2}$ c. $-\frac{1}{2}$ d. $-\frac{1}{8}$

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304. $1+\frac{1}{3}x+\frac{1\times 4}{3\times 6}x^2+\frac{1\times 4\times 7}{3\times 6\times 9}x^3+$ .... is equal to

A. $a.\ x$

B. b. $(1+x)^{1/3}$

C. c. $(1-x)^{1/3}$

D. d. $(1-x)^{-1/3}$

Answer: null

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305. The value of $\sum_{r=1}^{15} \frac{r2^r}{(r+2)!}$ is $\frac{(17)!-2^{16}}{(17)!}$ b. $\frac{(18)!-2^{17}}{(18)!}$ c. $\frac{(16)!-2^{15}}{(16)!}$ d. $\frac{(15)!-2^{14}}{(15)!}$

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306. $(n+2)nC_0\left(2^{n+1}\right)-(n+1)nC_1\left(2^n\right)+(n)nC_2\left(2^{n-1}\right)-\ldots.$ is equal to

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307. The value of $\sum_{r=0}^{50}(-1)^r\frac{(50)C_r}{r+2}$ is equal to $a.$ $\frac{1}{50\times 51}$ b. $\frac{1}{52\times 50}$ c. $\frac{1}{52\times 51}$ d. none of these

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308. In the expansion of $[(1+x)/(1-x)]^2$, the coefficient of x^n will be

$4n$ b. $4n-3$ c. $4n+1$ d. none of these

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309. Statement 1: The sum of coefficient in the expansion of $\left(3^{-x/4}+3^{5x/4}\right)^n is 2^n$. Statement 2: The sum of coefficient in the expansion of $(x+y)^n is 2^n$.

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310. Let n be a positive integer and k be a whole number, $k \leq 2n$. Statement 1: The maximum value of $\hat{} 2nC_k is {}^{2n}C_n$. Statement 2: $\frac{\hat{} (2n)C_{k+1}}{\hat{} (2n)C_k} \langle 1, f \text{ or } k=0,1,2,,n-1 and \frac{\hat{} (2n)C_k}{\hat{} (2n)C_{k-1}\rangle} 1, f \text{ or } k=n$

.

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311. Prove that $\sum_{r=0}^{2n} r\left(.^{2n} C_r\right)^2 = n^{4n} C_{2n}$.

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312. Statement 1: `^m C_r+^m C_(r-1)^n C_1+^mC_(r-2)^n C_2++^n C_r=0,ifm+n

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313. $1 + \left(\frac{1}{4}\right) + \left(\frac{1 \cdot 3}{4 \cdot 8}\right) + \left(\frac{1 \cdot 4 \cdot 7}{4 \cdot 8 \cdot 12}\right) + \ldots . =$

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314. If $|x| < 1, then 1 + n\left(\frac{2x}{1+x}\right) + \frac{n(n+1)}{2!}\left(\frac{2x}{1+x}\right)^2 + \ldots \ldots$ is equal to

A. a. $\left(\frac{2x}{1+x}\right)^n$

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

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

D. d. $\left(\frac{1+x}{1-x}\right)^{n}$

Answer: null

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315. Statement 1: If p is a prime number $(p \neq 2)$, then $\left[\left(2+\sqrt{5}\right)^{p}\right]-2^{p+1}$ is always divisible by $p(where[.]$ denotes the greatest integer function). Statement 2: if n prime, then $\hat{} \ nC_1,^n C_2,^n C_2,^n C_{n-1}$ must be divisible by $n\cdot$

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316. Statement 1: The total number of dissimilar terms in the expansion of $(x_1+x_2+\ +x_n)^3 is \frac{n(n+1)(n+2)}{6}$. Statement 2: The total number of dissimilar terms in the expansion of $(x_1 + x_2 + x_3)^n is \frac{n(n+1)(n+2)}{6}$.

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317. Statement 1: In the expansion of $(1+x)^{41}(1-x+x^2)^{40}$, the coefficient of x^{85} is zero. Statement 2: In the expansion of $(1+x)^{41} and (1-x+x^2)^{40}$, x^{85} term does not occur.

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318. Statement 1: The coefficient of x^n is $\left(1+x+\frac{x^2}{2!}+\frac{x^3}{3!}++\frac{x^n}{n!}\right)^3$ is $\frac{3^n}{n!}$ Statement 2: The coefficient of $x^n \in e^{3x} is \frac{3^n}{n!}$

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319. The value of $\sum_{r=0}^{10} r^{10}C_r, 3^r. (-2)^{10-r}$ is -

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320. The value of $\sum_{r=1}^{n}(-1)^{r+1}\frac{{}^{n}Cr}{r+1}$ is equal to a.$-\frac{1}{n+1}$ b. $\frac{1}{n}$ c. $\frac{1}{n+1}$ d. $\frac{n}{n+1}$

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321. If $\hat{}\,C0,^{C}1,^{C}2,^{C}n$ are the binomial coefficient, then $2\times C_1+2^3\times C^3+2^5\times C_5+$ equals $\frac{3^n+(-1)^n}{2}$ b. $\frac{3^n-(-1)^n}{2}$ c. $\frac{3^n+1}{2}$ d. $\frac{3^n-1}{2}$

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322. The value of $\frac{{}^{n}C_0}{n}+\frac{{}^{n}C_1}{n+1}+\frac{{}^{n}C_2}{n+2}+....+\frac{{}^{n}C_n}{2n}$ is equal to

A. a. $\int_0^1 x^{n-1}(1-x)^n dx$

B. b. $\int_1^2 x^n(x-1)^{n-1}dx$

C. c. $\int_1^2 x^{n-1}(1+x)^n dx$

D. d. $\int_0^1 (1-x)^{n-1} dx$

Answer: null

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323. The value of ${}^{20}C_0 + {}^{20}C_1 + {}^{20}C_2 + {}^{20}C_3 + {}^{20}C_4 + {}^{20}C_{12} + {}^{20}C_{13} + {}^{20}C_{14} + {}^{20}C_{15}$ is a. $2^{19} - \frac{\left(\hat{}(20)\text{C\_10} + {}^{20}C_9\right)}{2}$ b. $2^{19} - \frac{\left(\hat{}\ (20)C10 + 2 \times^{20} C9\right)}{2}$ c. $2^{19} - \frac{\hat{}\ (20)C10}{2}$ d. none of these

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324. If $\left(3 + x^{2008} + x^{2009}\right)^{2010} = a_0 + a_1 x + a_2 x^2 + \ + a_n x^n,$ then the value of $a_0 - \frac{1}{2}a_1 - \frac{1}{2}a_2 + a_3 - \frac{1}{2}a_4 - \frac{1}{2}a_5 + a_6 -$ is 3^{2010} b. 1 c. 2^{2010} d. none of these

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325. The sum of series $\hat{}\,(20)C_0 -^{20} C1 +^{20} C2 -^{20} C3 + \; +^{20} C10$ is

A. a.1/2* $\hat{}\,(20)C_{10}$

B. b. 0

C. c. $\hat{}\,(20)C10$

D. d. $- \wedge (20)C10$

Answer: null

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326. If

$(1+x)^n = C_0 + C_1x + C_2x^2 + \; + C_nx^n, thenC_0C_2 + C_1C_3 + C_2C_4 + \; +$

$\frac{(2n)!}{(n!)^2}$ b. $\frac{(2n)!}{(n-1)!(n+1)!}$ c. $\frac{(2n)!}{(n-2)!(n+2)!}$ d. none of these

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327. The value of $\lim_{n \to \infty} \sum_{r=0}^{n} \left(\sum_{t=0}^{r-1} \frac{1}{5^n} \cdot {}^nC_r \cdot {}^rC_t. \left(3^t\right) \right)$ is equal to

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328. Prove that

$C_0 - 2^2 C_1 + 3^2 C_2 - 4^2 C_3 + \ldots + (-1)^n (n+1)^2 \times C_n = 0 where C_r = {}^n C$

.

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329. Given that

$C_1 + 2C_2 x + 3C_3 x^2 + \; + 2nC_{2n} x^{2n-1} = 2n(1+x)^{2n-1}, where C_r = (2n)$

then prove that $C12 - 2C22 + 3C32 - \; - 2nC2n2 = (-1)^{\cap} C_n.$

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330. The remainder, if $1 + 2 + 2^2 + \ldots\ldots + 2^{1999}$ is divided by 5 is.

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331. The largest real value of x such that $\sum_{k=0}^{4}\left(\frac{3^{4-k}}{(4-k)!}\right)\left(\frac{x^k}{k!}\right)=\frac{32}{3}$ is.

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332. In the binomial expansion of $(a-b)^n, n \geq 5$, the sum of 5^{th} and 6^{th} term $\frac{a}{b}$ equals

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