TAREFA: COEFICIENTES BINOMIAIS

1. $\binom{8}{3} = \frac{8!}{3!5!} = \frac{8.7.6.\cancel{5}}{3.2.1\,\cancel{5}} = \frac{336}{6} = 56$ (B)

2. $\binom{200}{198} = \frac{200!}{198!2!} = \frac{200.199.\cancel{198}}{\cancel{198}\;2.1} = \frac{39.800}{2} = 19.900$ (A)

3. $\binom{n-1}{2} = \binom{n+1}{4}$ $\quad n > 0$ convém $\quad n \leq 0$ não convém

$\frac{(n-1)!}{2!(n-1-2)!} = 0$

$\frac{(n-1)(n-2)(n-3)!}{2.1\,(n-3)} = 0$

$\frac{n^2-2n-n+2}{2} = 0$

$0{,}5n^2 - 1{,}5n + 1 = 0$

$\frac{1}{1} + \frac{2}{2} = \frac{3}{2}$

$\frac{(n-1)}{2!(n-1-2)!} = \frac{(n+1)}{4!(n+1-4)!}$

$=$

$\frac{(n-1)!}{2!(n-1-2)!} = \frac{(n+1)\,n\,\cancel{(n-1)}!}{4!\,\cancel{(n-3)}!}$

$= \frac{1}{2} = \frac{n^2+n}{24}$

$2n^2 + 2n = 24$

$= 2n^2 + 2n - 24 = 0$

$3 + -4 = -1$ $\quad n < 0$

$3 \cdot -4 = -12$ $\quad$ não convém

$=$

$V = \{1, 2, 3\}$

4. $\binom{20}{13} + \binom{20}{14}$

soma 2 consec. (8)

$\binom{n}{k} + \binom{n}{n.k} = \binom{n+1}{k+1}$

$\frac{20}{13} + \frac{20}{14} = \frac{20+1}{13+1} = \frac{21}{14}$

=

complementares:

$\frac{21}{14} = \frac{21}{7}$

$14+7=21$

$\boxed{\frac{21}{7}}$

R: C

5. $\binom{n}{0} + \binom{n}{1} + \binom{n}{2} + \dots + \binom{n}{n}$? $\Rightarrow$ 2n

Na soma só varia o denominador.

6.

a) $\sum_{p=0}^{10} \binom{10}{p} = \binom{10}{0} + \binom{10}{1} + \binom{10}{2} + \binom{10}{3} + \binom{10}{4} + \binom{10}{5} + \binom{10}{6} + \binom{10}{7} + \binom{10}{8}$

$\binom{10}{9} + \binom{10}{10} = \boxed{2^{10} = 1024}$ linha 10 completa

b) $\sum_{p=0}^{9} \binom{10}{p} = \binom{10}{0} + \binom{10}{1} + \binom{10}{2} \dots \binom{10}{9} + \binom{10}{10} \rightarrow$ linha 10

$1024 - 1$

$\boxed{1023}$

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c) $\sum_{p=2}^{9} \binom{9}{p} = \binom{9}{2} + \binom{9}{3} + \binom{9}{4} \dots \binom{9}{9}$ → linha 9

$\binom{9}{0} - \binom{9}{1}$

$2^9 = 512$. $512 - 1 - 9 = \boxed{502}$

d) $\sum_{p=4}^{10} \binom{p}{4} = \binom{4}{4} + \binom{5}{4} + \binom{6}{4} \dots \binom{10}{4}$ somando a coluna

$\binom{11}{5} = \frac{11.10.9.8.7.\cancel{6!}}{5.4.3.2.1.\cancel{6!}} = \boxed{462}$

e) $\sum_{p=5}^{10} \binom{p}{5} = \binom{5}{5} + \binom{6}{5} + \binom{7}{5} + \binom{8}{5} \dots \binom{10}{5}$ somando a coluna

$\binom{11}{6} = \frac{11.10.9.8.7.\cancel{6!}}{\cancel{6!}.5.4.3.2.1} = \boxed{462}$

7.

a) $\sum_{k=0}^{5} \binom{5}{k} = \binom{5}{0} + \binom{5}{1} \dots \binom{5}{5} = 2^5 = 32$

b) $\sum_{k=0}^{6} = \binom{6}{k} = \binom{6}{0} + \binom{6}{1} \dots \binom{6}{6} = 2^6 = 64$

c) $\sum_{k=0}^{7} \binom{7}{k} = \binom{7}{0} + \binom{7}{1} \dots \binom{7}{7} = 2^7 = 128$

d) $\sum_{k=0}^{8} \binom{8}{k} = \binom{8}{0} + \binom{8}{1} \dots \binom{8}{8} = 2^8 = 256$

e) $\sum_{k=0}^{9} \binom{9}{k} = \binom{9}{0} + \binom{9}{1} \dots \binom{9}{9} = 2^9 = 512$

R: E

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