Tarefa básica

COEFICIENTE BINOMIAL

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

Alternativa B

2) $\binom{200}{198} = \frac{200!}{198!(200-198)!} = \frac{200!}{198!\,2!} = \frac{200.199.\cancel{198!}}{\cancel{198!}\,2.1} = \frac{39800}{2} = 19900$

Alternativa A

3) $\binom{n-1}{2} = \binom{n+1}{4}$

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

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

$\frac{(n-1)!\,4.3.\cancel{2!(n-3)!}}{\cancel{2!\,(n-3)!}} = (n+1)n(n-1)!$

$\frac{\cancel{(n-1)!}\,12}{\cancel{(n-1)!}} = (n+1)n$

$12 = n^2 + n$

$n^2 + n - 12 = 0$

$\Delta\ 1^2 + 4.1.(-12)$

$\Delta\ 1 - 48$

$\Delta\ 49$

$n = \frac{-1 \pm 7}{2}$

$n' = \frac{-1-7}{2} = \frac{-8}{2} = -4$ NÃO CONVÉM

$n'' = \frac{-1+7}{2} = \frac{6}{2} = 3$

ou $n < K$

$n - 1 < 2$ e $n + 1 < 4$

$n < 2 + 1$ $\quad$ $n < 4 - 1$

$n < 3$ $\quad$ $n < 3$

$n < 3$

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

④ $\binom{20}{13} + \binom{20}{14} =$

soma de 2 consecutivos $\rightarrow \binom{n+1}{K+1}$ Então, $\underbrace{\binom{21}{14}}$

complementares $\rightarrow \binom{n}{K} = \binom{n}{n-K} \rightarrow \binom{21}{14} = \underbrace{\binom{21}{21-14}}$

Alternativa C $\left\{ \binom{21}{7} \right.$

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

soma na linha $n \rightarrow 2^n$

⑥ a) $\sum_{p=0}^{10} \binom{10}{p} \rightarrow \binom{10}{0} + \binom{10}{1} + \binom{10}{2} + \dots + \binom{10}{10}$

soma na linha $10 \rightarrow 2^{10} = 1024$

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

soma na linha $10 \rightarrow 2^{10}$

$2^{10} - \binom{10}{10}$

$1024 - 1 = 1023$

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

soma na linha 9 $\rightarrow 2^9$

$2^9 - \binom{9}{0} - \binom{9}{1}$

$512 - 1 - 9 = 512 - 10 = 502$

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

soma na coluna 4 $\rightarrow \binom{n+1}{k+1} = \binom{11}{5}$

* numerador
↳ mesma quantidade do denominador.

$\binom{11}{5} = \dfrac{\overbrace{11 . 10 . 9 . 8 . 7}^{5 \text{ unidades}}}{\underbrace{5 . 4 . 3 . 2 . 1}_{5 \text{ unidades}}} = \dfrac{5544\cancel{0}}{12\cancel{0}} = 462$

e) $\sum_{p=5}^{10} \binom{p}{5} \rightarrow \binom{5}{5} + \binom{6}{5} + \binom{7}{5} + \dots + \binom{10}{5}$

soma na coluna 5 $\rightarrow \binom{11}{6}$

$\binom{11}{6} = \dfrac{\overbrace{11 . 10 . 9 . 8 . 7 . 6}^{6 \text{ unidades}}}{\underbrace{6 . 5 . 4 . 3 . 2 . 1}_{6 \text{ unidades}}} = \dfrac{33264\cancel{0}}{72\cancel{0}} = 462$

7) $$\sum_{k=0}^{n} \binom{n}{k} = 512$$

$$\binom{n}{0} + \dots + \binom{n}{n} = 512$$

soma na linha $n \rightarrow 2^n$

$$2^n = 512$$

$$2^n = 2^9 \longrightarrow n = 9$$

Alternativa E