Nome: Mikaela dos Santos Ferreira Prontuário: 1890336 CTII-348

Coeficientes Binomiais - Triângulo de Pascal/Tartaglia

Exercícios 1,2 e 3

01.

$$\binom{8}{3} = \frac{8!}{3!\,5!} = \frac{8\,7\,6\,\cancel{5!}}{3\,2\,1\,\cancel{5!}} = \frac{336}{6} = 56 \,//$$

Resposta B

02.

$$\binom{200}{198} = \frac{200!}{198!\,2!} = \frac{200\;199\;\cancel{198!}}{\cancel{198!}\;2\;1} = \frac{39800}{2} = 19900 \,//$$

Resposta A

03. $\binom{N-1}{2} = \binom{N+1}{4}$

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

$$\frac{(N-1)\cdot(N-2)}{2} = \frac{N+1 \cdot N \cdot N-1 \cdot N-2}{24}$$

$N-1=0$ | $N-2=0$
$N=1$ | $N=2$

$$\frac{N-1 \cdot N-2}{2} - \frac{N+1 \cdot N \cdot N-1 \cdot N-2}{24} = 0$$

$N-1 . N-2 - (12 - N.(N+1) = 0$

$-N^2 - N + 12 = 0$

$N = 3$

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

Exercícios 4,5 e 6

04. $\binom{20}{13} + \binom{20}{14} = \binom{21}{7}$ Resposta C

2 consecutivos da linha 20.

05. $\binom{N}{0} + \binom{N}{2} + \dots \binom{N}{N} = 2^n$

06.

a) $\sum_{p=0}^{10} \binom{10}{p} = \binom{10}{0} + \binom{10}{1} + \binom{10}{2} + \binom{10}{3} + \dots \binom{10}{10}$

linha 10

$2^{10} = 1024$//

B) $\sum_{p=0}^{9} \binom{10}{p} = \binom{10}{0} + \binom{10}{1} + \binom{10}{2} + \binom{10}{3} + \dots \binom{10}{9}$

linha 10 = $\binom{10}{10}$

$2^{10} = 1024 - 1 = 1023$//

c) $\sum_{p=2}^{9} \binom{9}{p} = \binom{9}{2} + \binom{9}{3} + \binom{9}{4} + \binom{9}{5} + \dots \binom{9}{9}$

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

$2^9 = 512 - 1 - 9 = 502$//

Continuação exercício 6

b) $\sum_{p=4}^{10} \binom{p}{4} = \binom{4}{4} + \binom{5}{4} + \binom{6}{4} + \ldots \binom{10}{4}$

$\binom{4}{4} = \frac{4!}{4!\,0!} = \frac{1}{1} = 1$

$\binom{5}{4} = \frac{5!}{4!\,1!} = \frac{5\,\cancel{4!}}{\cancel{4!}\,1} = 5$

$\binom{6}{4} = \frac{6!}{4!\,2!} = \frac{6.5\,\cancel{4!}}{\cancel{4!}\,2\,1} = \frac{30}{2} = 15$

$\binom{7}{4} = \frac{7!}{4!\,3!} = \frac{7\,6\,5\,\cancel{4!}}{\cancel{4!}\,3\,2\,1} = \frac{210}{6} = 35$

$\binom{8}{4} = \frac{8!}{4!\,4!} = \frac{8\,7\,6\,5\,\cancel{4!}}{\cancel{4!}\,4\,3\,2\,1} = \frac{1680}{24} = 70$

$\binom{9}{4} = \frac{9!}{4!\,5!} = \frac{9\,8\,7\,6\,5\,\cancel{4!}}{\cancel{4!}\,5\,4\,3\,2\,1} = \frac{15120}{120} = 126$

$\binom{10}{4} = \frac{10!}{4!\,6!} = \frac{10\,9\,8\,7\,6\,5\,\cancel{4!}}{\cancel{4!}\,6\,5\,4\,3\,2\,1} = \frac{151200}{720} = 210$

$1 + 5 + 15 + 35 + 70 + 126 + 210 = \boxed{462}$

Continuação exercício 6

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

$\binom{5}{5} = \dfrac{5!}{5!\,0!} = \dfrac{1}{1} = 1$

$\binom{6}{5} = \dfrac{6!}{5!\,1!} = \dfrac{6\,\cancel{5!}}{\cancel{5!}\,1} = 6 \,//$

$\binom{7}{5} = \dfrac{7!}{5!\,2!} = \dfrac{7.6\,\cancel{5!}}{\cancel{5!}\,2.1} = \dfrac{42}{2} = 21 \,//$

$\binom{8}{5} = \dfrac{8!}{5!\,3!} = \dfrac{8.7.6\,\cancel{5!}}{\cancel{5!}\,3\,2\,1} = \dfrac{336}{6} = 56 \,//$

$\binom{9}{5} = \dfrac{9}{5!\,4!} = \dfrac{9\,8\,7\,6\,\cancel{5!}}{\cancel{5!}\,4\,3\,2\,1} = \dfrac{3024}{24} = 126 \,//$

$\binom{10}{5} = \dfrac{10}{5!\,5!} = \dfrac{10\;9\;8\;7\;6\,\cancel{5!}}{\cancel{5!}\;5\;4\;3\;2\,1} = \dfrac{30240}{120} = 252 \,//$

$1 + 6 + 21 + 56 + 126 + 252 = \boxed{462}$

Exercício 7

07.

$$\sum_{k=0}^{m} \binom{m}{k} = 512$$

linha m

$$2^m = 2^9$$

$$2^9 = 512$$

$$m = 9$$