INSTITUTO FEDERAL DE EDUCAÇÃO, CIÊNCIA E TECNOLOGIA DE SÃO PAULO – CAMPUS CUBATÃO

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Turma: CTII 317

COEFICIENTES BINOMIAIS – TRIÂNGULO DE PASCAL/TARTAGLIA

QUESTÕES

01.

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12 07 21

Tarefa Básica – Coeficientes Binomiais

01. $\binom{8}{3} = \frac{8!}{3!\,5!} = \frac{8.7.6.\cancel{5!}}{3.2.1.\cancel{5!}} = \frac{336}{6} = 56$

Resposta: Letra B.

02.

02. $\binom{200}{198} = \frac{200!}{198!\,2!} = \frac{200.199.\cancel{198}.\cancel{197}.\cancel{196}\ldots}{\cancel{198}.\cancel{197}.\cancel{196}\ldots 2!} = \frac{39800}{2} = 1990$

Resposta: Letra A.

03.

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

Equação

$(n-\cancel{1})+(n+\cancel{1})=6$

$2n = 6$

$n = 3$

$n > 0$, pois se for o inverso, será insignificante para a conta.

Resposta: $V=\{1, 2, 3\}$.

04.

04. $\binom{20}{13} + \binom{20}{14} = \frac{20^{+1}}{14^{:2}} = \frac{21}{7}$

Resposta: Letra C.

05.

05. $\binom{n}{0} + \binom{n}{1} + \binom{n}{2} + \dots + \binom{n}{n} = 2^n$

Pelo teorema: $C_{n,0} + C_{n,1} + C_{n,2} + \dots + C_{n,n} = 2^n$

06.

06. a) $\sum_{p=0}^{10} \binom{10}{p} = \binom{10}{0} + \binom{10}{1} + \binom{10}{2} + \dots \binom{10}{10} = 2^{10} = 1024$

$2^{10} = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 1024$

b) $\sum_{p=0}^{9} \binom{10}{p} = \binom{10}{0} + \binom{10}{1} + \binom{10}{2} + \dots \binom{10}{9} = 1023$

Limpa $10 - \binom{10}{10}$

$2^{10} - 1$

$1024 - 1 = 1023$

c) $\sum_{p=2}^{9} \binom{9}{p} = \binom{9}{2} + \binom{9}{3} + \binom{9}{4} + \dots \binom{9}{9} = 502$

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

$2^9 - 1 - 9$

$512 - 10 = 502$

d) $\sum_{p=4}^{10} \binom{p}{4} = 462$

$\binom{4}{4} + \binom{5}{4} + \binom{6}{4} + \binom{7}{4} + \binom{8}{4} + \binom{9}{4} + \binom{10}{4} = 462$

1 5 15 35 70 126 210

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

$\frac{7!}{4!\,3!} = \frac{7.6.5.\cancel{4!}}{\cancel{4!}.3.2} = 35$

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

$\frac{8!}{4!\,4!} = \frac{8.7.6.5.\cancel{4!}}{\cancel{4!}.4.3.2} = 70$

$\frac{9!}{5!\,4!} = \frac{9.8.7.6.\cancel{5!}}{\cancel{5!}\,4.3.2.1} = 126$

$\frac{10!}{6!\,4!} = \frac{10.9.8.7.\cancel{6!}}{\cancel{6!}.4.3.2.1} = 210$

e) $\sum_{p=5}^{10} \binom{p}{5} = 462$

$\binom{5}{5} + \binom{6}{5} + \binom{7}{5} + \binom{8}{5} + \binom{9}{5} + \binom{10}{5}$

1 6 21 56 126 252

$\frac{6!}{5!\,1!} = \frac{6.\cancel{5!}}{\cancel{5!}.1} = 6$

$\frac{8!}{5!\,3!} = \frac{8.7.6.\cancel{5!}}{\cancel{5!}\,3.2.1} = 56$

$\frac{7!}{5!\,2!} = \frac{7.6.\cancel{5!}}{\cancel{5!}.2} = 21$

$\frac{9!}{5!\,4!} = \frac{9.8.7.6.5!}{5!\,4.3.2} = 126$

$\frac{10!}{5!\,5!} = \frac{10.9.8.7.6.\cancel{5!}}{\cancel{5!}\,5.4.3.2} = 252$

07.

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

$$\binom{9}{0} + \binom{9}{1} + \binom{9}{2} + \binom{9}{3} + \binom{9}{4} + \binom{9}{5} + \binom{9}{6} + \binom{9}{7} + \binom{9}{8} + \binom{9}{9}$$

1 9 36 84 126 126 84 36 9 1

$$\frac{9!}{7!\,2!} = \frac{9.8.\cancel{7!}}{\cancel{7!}.2} = 36$$

$$\frac{9!}{6!\,3!} = \frac{9.8.7.\cancel{6!}}{\cancel{6!}.3.2} = 84$$

$$\frac{9!}{7!\,2!} = \frac{9.8.\cancel{7!}}{\cancel{7!}.2} = 36$$

$$\frac{9!}{8!\,1!} = \frac{9.\cancel{8!}}{\cancel{8!}.1} = 9$$

$$\frac{9!}{5!\,4!} = \frac{9.8.7.6.\cancel{5!}}{\cancel{5!}.4.3.2} = 126$$

$$\frac{9!}{3!\,6!} = \frac{9.8.7.\cancel{6!}}{\cancel{6!}.3.2} = 84$$

$$\frac{9!}{8!\,1!} = 9$$

Resposta: Letra E.