Tarefa Básica - Coeficientes Binomiais

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

B

02 - $\binom{200}{198} = \frac{200!}{198!(200-198)!} = \frac{200.199.\cancel{198!}}{\cancel{198!}\,2!} = \frac{39.800}{2} = 19.900$

A

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

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

$\frac{n^2-3n+2}{2} - 0,5n^2 - 1,5n + 1 = 0$

$\Delta = 2,25 - 2$

$\Delta = 0,25$

$x = \frac{1,5 \pm \sqrt{0,25}}{1}$

$\boxed{x1 = 2}$
$\boxed{x2 = 1}$

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

$2n+2 = 4n-4$

$2n - 4n = -4 - 2$

$-2n = -6\ (-1)$

$n = 3$

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

04 - $\binom{20}{13} + \binom{20}{14} = \boxed{\binom{21}{14}}$ $14 + 7 = 21$ $\boxed{\binom{21}{7}}$

C

05 - $\binom{n}{0} + \binom{n}{1} + \binom{n}{2} + \dots + \binom{n}{n}$?

O numerador n permanece em todas as situações, enquanto os denominadores alteram.
Então, isso é uma soma de linha. Podemos representar como:

2^x, onde x é igual ao último denominador.
Então:

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

06 - a) $\sum_{p=0}^{10} \binom{10}{p} = 2^{10} = \boxed{1.024}$

b) $\sum_{p=0}^{9} \binom{10}{p} = 2^{10} - 1 = 1.024 - 1 = \boxed{1.023}$

c) $\sum_{p=2}^{9} \binom{9}{p} = 2^{9} - 1 - 9 = 512 - 10 = \boxed{502}$

d) $\sum_{p=4}^{10} \binom{p}{4} = \binom{4}{4} + \binom{5}{4} + \binom{6}{4} + \binom{7}{4} + \binom{8}{4} + \binom{9}{4} + \binom{10}{4} = \binom{11}{5}$

$\binom{11}{5} = \frac{11!}{5!\,(11-5)!} = \frac{11.10.9.8.7.\cancel{6!}}{5!\ \cancel{6!}} = \frac{55.440}{120} = \boxed{462}$

e) $\sum_{p=5}^{10} \binom{p}{5} = \binom{5}{5} + \binom{6}{5} + \binom{7}{5} + \binom{8}{5} + \binom{9}{5} + \binom{10}{5} = \binom{11}{5}$

$\binom{11}{5} = \boxed{462}$

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

$\binom{m}{0} + \binom{m}{1} + \binom{m}{2} + \dots + \binom{m}{m} = 2^{m} = 512$

$2^{m} = 512$ $\qquad 512 = 2^{9}$

$2^{m} = 2^{9}$

$\boxed{m = 9}$