1) $\binom{8}{3} = \frac{8!}{3!(8-3)!} = \frac{8!}{3!5!} = \frac{8.7.6.5!}{3.2.1.5!} = \frac{336}{6} = 56$

B) X - Alternativa B

2) $\binom{200}{198} = \frac{200!}{198!(200-198)!} = \frac{200!}{198!2!} \rightarrow \frac{200.199.198!}{198!\,2.1}$

$= \frac{39800}{2} = 19900$

A) Alternativa A

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

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

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

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

$12 = \frac{(n^2+n).\cancel{(n-1)!}}{\cancel{(n-1)!}}$

$x = \frac{-1-7}{2} = -4$

$n + n^2 - 12 = 0 \rightarrow \Delta = 1^2 - 4.1.(-12)$

$\Delta = 49$

$x = \frac{-1+7}{2} = 3$

2° caso

$\binom{n-1}{2} = \binom{n+1}{4} = 0$ $\quad$ $* \; n < K$

1°

$n-1 < 2$

$n < 3$

2°

$n+1 < 4$

$n < 4-1$

$n < 3$ //

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

4) $\left(\binom{20}{13} + \binom{20}{14}\right) = \binom{n}{K} = \binom{n}{n-k}$

$\binom{21}{14} = \binom{21}{21-14} = \binom{21}{7}$

C) Alternativa C

5) $\binom{n}{0} + \binom{n}{1} + \binom{n}{2} + \ldots + \binom{n}{n} = 2^n$ //

6) a) $\sum_{p=0}^{10} \binom{10}{p} = \binom{10}{0} + \binom{10}{1} + \ldots + \binom{10}{9} = 2^{10}$

$2^{10} = 1.024$ //

tilibra

b) $\sum_{p=0}^{9} \binom{10}{p} = \binom{10}{0} + \binom{10}{1} + \dots + \binom{10}{9} = 2^{2} - \binom{10}{10} = 1024$

$1024 - \frac{10}{10} \to 1024 - 1 \to 1023$ //

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

$= 512 - 9 - 1 = 502$

d) $\sum_{p=4}^{10} \binom{p}{4} = \binom{4}{4} + \binom{5}{4} + \dots \binom{10}{4} = \binom{11}{5}$ → soma na coluna 4

$\to \binom{11}{5} = \frac{11!}{5!(11-5)!} = \frac{11.10.9.8.7.\cancel{6!}}{5!\,\cancel{6!}}$

~~e)~~ $= \frac{11.\cancel{10}.\cancel{9}.\cancel{8}.7}{\cancel{5}.\cancel{4}.\cancel{3}.2.1}$

$= \frac{924}{2} = 462$ //

e) $\sum_{p=5}^{10} \binom{p}{5} = \binom{5}{5} + \binom{6}{5} + \dots + \binom{10}{5} = \binom{11}{6}$ soma na coluna 5

$\binom{11}{6} = \frac{11!}{6!(11-6)!} = \frac{11.10.9.8.7.\cancel{6!}}{\cancel{6!}\,5!} = \frac{11.\cancel{10}.\cancel{9}.\cancel{8}.7}{\cancel{5}.\cancel{4}.\cancel{3}.2.1}$

$= \frac{924}{2} = 462$ //

7)

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

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

$$\begin{array}{r|l}
512 & 2 \\
256 & 2 \\
128 & 2 \\
64 & 2 \\
32 & 2 \\
16 & 2 \\
8 & 2 \\
4 & 2 \\
2 & 2 \\
\hline
 & 2^9
\end{array}$$

$$2^m=512$$

$$2^m=2^9 \rightarrow m=9$$

Letra E)