(1) número bional $\binom{8}{3}$

$$\binom{8}{3}! = \frac{8!}{3!(8-3)!} \qquad \frac{8\cdot 7\cdot 6\cdot 5!}{\underset{3\cdot 2\cdot 1}{3!}\,5!} : \frac{336}{6} = 56$$

(2) número bional $\binom{200}{198}$

$$\binom{200}{198} = \frac{200\cdot 199\cdot \cancel{198!}}{\cancel{198!}\,\underset{2!}{(200-198)!}} = \frac{39800}{2} = 19900$$

(3) Resolver a equação

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

$$n<3 \qquad n<3 \quad n+1,\ 2,\ 3$$

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

(4) O valor de $\binom{20}{13}+\binom{20}{14}$

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

(5) Quanto vale $\binom{n}{0}+\binom{n}{1}+\binom{n}{2}+\dots+\binom{n}{n}$?

$$1+\binom{n}{1}+\binom{n}{2} = 2^n$$

⑥

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

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

$$\downarrow$$

$$1023$$

$$\sum_{p=2}^{9} \binom{9}{2} + \binom{9}{3} + \dots + \binom{9}{9} = \begin{pmatrix} 9 & -9 \\ 1 & 0 \end{pmatrix} \quad 512 - 9 - 1 \rightarrow 502$$

$$\sum_{p=4}^{10} \binom{4}{4} + \binom{5}{4} + \dots \binom{10}{4} = \binom{11}{5}$$

$$\frac{11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot \cancel{6!}}{5!\,\cancel{6!}} = \frac{924}{2} = 462$$

$$\sum_{p=5}^{10} \binom{5}{5} + \binom{6}{5} + \dots + \binom{10}{5} = \binom{11}{6}$$

$$\rightarrow \frac{11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot \cancel{6!}}{\cancel{6!}\,5!} = \frac{924}{2} = 462$$

⑦

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

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

$$2^m = 9^2 = m = 9$$

$$2^9 = 512$$