Tarefa Básica

1.

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

$\boxed{B}$

2-

$$\binom{200}{198} = \frac{200!}{198!\,2!} = \frac{200.199.198}{198\ 2.1} = \frac{39.800}{2} = 19.900$$

A

3-

$$\binom{m-1}{2} = \binom{m+1}{4}$$

$2+4=6$

$m>0$, porque se m for <0 ele ~~não~~ servem para a conta!

complementares

$m-1+m+1 \leq 6$

$m-1+m+1 \leq 6$

$2m \leq 6$

$m \leq \frac{6}{2}$

$m \leq 3$

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

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4- $\binom{20}{13} + \binom{20}{14} = ?$

soma de dois consecutivos

$\binom{n}{k} + \binom{n}{n-k} = \binom{n+1}{k+1}$

$\binom{20}{13} + \binom{20}{14} = \binom{20+1}{13+1} = \binom{21}{14}$

$\binom{21}{14} = \binom{21}{7} \Rightarrow$ complementares

$$14 + 7 = 21$$

$$\binom{21}{7}$$

$\boxed{C}$

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

Soma, na linha n por isso a resposta é 2n, apenas o denominador varia.

6-

a) $\sum_{p=0}^{10}\binom{10}{p} = \binom{10}{0}+\binom{10}{1}+\binom{10}{2}+\binom{10}{3}+\binom{10}{4}+\binom{10}{5}+\binom{10}{6}+\binom{10}{7}+\binom{10}{8}+$

1 + 10 + 45 + 120 + 210 + 252 + 210 + 120 + 45 +

$\binom{10}{9}+\binom{10}{10}$ = linha 10 completa

10 + 1

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

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

$2^{10} = 1024$

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

$1024 - 1 = \boxed{1023}$

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

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

$2^9 = 512$

$512 - 1 - 9 = \boxed{502}$

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

$\binom{4}{4} = \frac{4!}{4!\,0!} = \frac{4.3.2.1}{4.3.2.1\,0} = \frac{24}{24} = 1$

$\binom{5}{4} = \frac{5!}{4!\,1!} = \frac{5.4.3.2.\cancel{1}}{4.3.2.1.\cancel{1}} = \frac{120}{24} = 5$

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$\binom{6}{4} = \frac{6!}{4!2!} = \frac{6.5.\cancel{4}}{\cancel{4}.2.1} = \frac{30}{2} = 15$

$\binom{7}{4} = \frac{7!}{4!3!} = \frac{7.6.5.\cancel{4}}{\cancel{4}\ 3.2.1} = \frac{210}{6} = 35$

$\binom{8}{4} = \frac{8!}{4!4!} = \frac{8.7.6.5.\cancel{4}}{\cancel{4}\ 4.3.2.1} = \frac{1680}{24} = 70$

$\binom{9}{4} = \frac{9!}{4!5!} = \frac{9.8.7.6.\cancel{5}}{4.3.2.1.\cancel{5}} = \frac{3.024}{24} = 126$

$\binom{10}{4} = \frac{10!}{4!6!} = \frac{10.9.8.7.\cancel{6}}{4.3.2.1.\cancel{6}} = \frac{5.040}{24} = 210$

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

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

$\binom{5}{5} = \frac{5!}{5!1!} = \frac{5.4.3.2.\cancel{1}}{5.4.3.2.1\cancel{1}} = \frac{120}{120} = 1$

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

$\binom{7}{5} = \frac{7!}{5!2!} = \frac{7.6.\cancel{5}}{\cancel{5}!2.1 = 2} = \frac{42}{2} = 21$

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

$\binom{9}{5} = \frac{9!}{5!4!} = \frac{9.8.7.6.\cancel{5}}{\cancel{5}!4.3.2.1.} \quad \frac{3.024}{24} = 126$

$\binom{10}{5} = \frac{10!}{5!5!} = \frac{10.9.8.7.6.\cancel{5}}{\cancel{5}!5.4.3.2.1} = \frac{30.240}{120} = 252$

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

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S T Q Q S S D

7-

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

$\boxed{m \text{ vale } 9}$

512	2
256	2
128	2
64	2
32	2
16	2
8	2
4	2
2	2
1	1

$2^9 \cdot 1$

$2^2 = 4$ $2^6 = 64$

$2^3 = 8$ $2^7 = 128$

$2^4 = 16$ $2^8 = 256$

$2^5 = 32$ $\boxed{2^9 = 512}$

$2^9 \cdot 1 = 512$

$\boxed{E}$

$$\binom{9}{0} = \frac{9!}{0!9!} = \frac{9.8.7.6.5.4.3.2.1}{0!\,9.8.7.6.5.4.3.2.1} = \frac{362.880}{362.880} = 1$$

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

$$\binom{9}{2} = \frac{9}{2!7!} = \frac{9.8.\cancel{7}}{2.1\cancel{7!}} = \frac{72}{2} = 36$$

$$\binom{9}{3} = \frac{9!}{3!6!} = \frac{9.8.7.\cancel{6}}{3.2.1\cancel{6!}} = \frac{504}{6} = 84$$

$$\binom{9}{4} = \frac{9!}{4!5!} = \frac{9.8.7.6.\cancel{5}}{4.3.2.1\cancel{5}} = \frac{3024}{24} = 126$$

$$\binom{9}{5} = \frac{9!}{5!4!} = \frac{9.8.7.6.5.}{\cancel{5!}\,4.3.2.1} = \frac{3024}{24} = 126$$

$$\binom{9}{6} = \frac{9!}{6!3!} = \frac{9.8.7.\cancel{6}}{\cancel{6!}\,3.2.1} = \frac{504}{6} = 84$$

$$\binom{9}{7} = \frac{9!}{7!2!} = \frac{9.8.\cancel{7}}{\cancel{7!}\,2.1} = \frac{72}{2} = 36$$

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

$$\binom{9}{9} = \frac{9!}{9!0} = \frac{9.8.7.6.5.4.3.2.1}{9.8.7.6.5.4.3.2.1\,0!} = \frac{362.880}{362.880} = 1$$

$R = 1+9+36+84+126+126+84+36+9+1 = \boxed{512}$

spiral