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Exercícios - Triângulo de Pascal

$$1. \binom{8}{3} = \frac{8!}{3!(8-3)!} = \frac{8!}{3!5!} = \frac{8 \cdot 7 \cdot 6 \cdot \cancel{5!}}{3 \cdot 2 \cdot 1 \cdot \cancel{5!}} = \frac{336}{6} = 56 \quad \text{R: B)}$$

$$2. \binom{200}{198} = \frac{200!}{198!(200-198)!} = \frac{200!}{198!2!} = \frac{200 \cdot 199 \cdot 198 \cdot \cancel{198!}}{\cancel{198!} \cdot 2!} = \frac{39800}{2} = 19900 \quad \text{R: a)}$$

$$3. \binom{n-1}{2} = \binom{n+1}{4} \quad \begin{aligned} 4(n-1) &= 2(n+1) \\ 4n-4 &= 2n+2 \\ 4n-2 &= 2n+0 \end{aligned} \quad \begin{aligned} \Delta &= (-2)^2 - 4 \cdot 4 \cdot (-2) \\ \Delta &= 4 + 32 \\ \Delta &= 36 \end{aligned}$$

$$x = \frac{(-2) \pm \sqrt{36}}{2 \cdot 2} = \frac{-2 \pm 6}{-4} = \frac{4}{-4} = -1 \quad \left\{ \begin{aligned} x &= \frac{-2-6}{-4} = \frac{-8}{-4} = 2 \\ x &= \frac{-2+6}{-4} = \frac{4}{-4} = -1 \end{aligned} \right.$$

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

$$4. \binom{20}{13} + \binom{20}{14} = \frac{21}{14} = \frac{21}{7}$$

$$5. \binom{n}{0} + \binom{n}{1} + \binom{n}{2} + \dots + \binom{n}{n} = \text{soma na linha } n \rightarrow 2^n$$

$$a) \sum_{p=0}^{10} \binom{10}{p} = 2^{10} = 1024$$

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

$$c) \sum_{p=2}^9 \binom{9}{p} = \binom{9}{2} + \binom{9}{3} + \dots + \binom{9}{9} \quad \left| \begin{array}{l} \text{linha 10} - \binom{10}{0} \\ \text{linha 9} - \binom{9}{0} - \binom{9}{1} \end{array} \right. \quad \begin{array}{l} 2^{10} - 1 \\ 2^9 - 1 - 9 = 512 - 10 = 502 \end{array}$$

$$7. \sum_{k=0}^m \binom{m}{k} = 512 \rightarrow 2^9 = 512 \quad m=9$$

$$\sum_{k=0}^9 \binom{9}{k} = \binom{9}{0} + \binom{9}{1} + \binom{9}{2} + \dots + \binom{9}{9} = \quad R. 2)$$

soma na linha 9 $\rightarrow 2^9 = 512$