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Exercícios

1 $(1 + 2x^2)^6$ $\quad |x^8 ?$

$\binom{6}{k} 1^{6-k} \cdot (2x^2)^k = \binom{6}{k} 2^k \cdot x^{2k}$, $\quad 2k = 8$, $k = 8/4 \rightarrow k = 4$

$\binom{6}{4} 2^4 \cdot x^8 = \frac{6!}{4!\, 2!} \cdot 16 \cdot x^8 = \underbrace{240x^8}$ alternativa C//

2. $(14x - 13y)^{237} = (14.1 - 13.1)^{237} = 1^{237} = \underbrace{1}$

$x = 1 \quad y = 1$ alternativa B//

3 $(x + a)^{11}$ $\quad 1386x^5$

$T_{k+1} = \binom{11}{k} x^{11-k} a^k = 1386x^5$

$11 - k = 5$

$11 - 5 = k$

$k = 6$

$T_{6+1} = \binom{11}{6} \cancel{x^5} a^6 = 1386\cancel{x^5}$

$T_7 = \frac{11!}{6!\, 5!} a^6 = 1386$

$462a^6 = 1386$

$a^6 = 1386/462$

$a^6 = 3$

$\underbrace{a = \sqrt[6]{3}}$ alternativa (A)//

4. $\left(x + \frac{1}{x^2}\right)^9 = T_{k+1} = \binom{9}{k} x^{9-k} \cdot \left(\frac{1}{x^2}\right)^k$

$$T_{k+1} = \binom{9}{k} x^{9-k} \cdot (x^{-2})^k$$

$$T_{k+1} = \binom{9}{k} \cdot x^{9-3k}$$

$$9 - 3k = 0 \rightarrow 9/3 = k$$
$$9 = 3k \qquad k = 3$$

$\binom{9}{k} \longrightarrow \binom{9}{3}$ alternativa (D)//

5. $\left(x + \frac{1}{x^2}\right)^n \longrightarrow T_{k+1} = \binom{n}{k} x^{n-k} \cdot \left(\frac{1}{x^2}\right)^k$

$$T_{k+1} = \binom{n}{k} x^{n-k} \cdot (x^{-2})^k$$

$n - 3k = 0$

$n = 3k$ $\qquad T_{k+1} = \binom{n}{k} x^{n-3k}$

$n/3 = k$

→ Sendo assim, para que seja verdadeiro, o k deve pertencer ao conjunto dos números naturais, e isso só é possível se o n for divisível por 3.

alternativa (C)//

6. $K = \left(3x^3 + \frac{2}{x^2}\right)^5 - \left(243x^{15} + 810x^{10} + 1080x^5 + \frac{240}{x^5} + \frac{32}{x^{10}}\right)$

$\left(3x^3 + \frac{2}{x^2}\right)^5 = \binom{5}{0} \cdot (3x^3)^5 + \binom{5}{1} (3x^3)^4 \cdot \left(\frac{2}{x^2}\right) +$

$+ \binom{5}{2} \cdot (3x^3)^3 \cdot \left(\frac{2}{x^2}\right)^2 + \binom{5}{3} (3x^3)^2 \cdot \left(\frac{2}{x^2}\right)^3 +$

$+ \binom{5}{4} \cdot (3x^3) \cdot \left(\frac{2}{x^2}\right)^4 + \binom{5}{5} \cdot \left(\frac{2}{x^2}\right)^5$

$= 243x^{15} + 810x^{10} + 1080x^5 + 720 + \frac{240}{x^5} + \frac{32}{x^{10}}$

$K = \left(3x^3 + \frac{2}{x^2}\right)^5 - \left(243x^{15} + 810x^{10} + 1080x^5 + \frac{240}{x^5} + \frac{32}{x^{10}}\right)$

$= \underline{720}$. alternativa (E)//

7. $(2x + y)^5 = \binom{5}{0} (2x)^5 + \binom{5}{1} (2x)^4 y + \binom{5}{2} (2x)^3 y^2 +$

$+ \binom{5}{3} (2x)^2 \cdot y^3 + \binom{5}{4} 2x \cdot y^4 + \binom{5}{5} y^5$

$\binom{5}{0} 2^5 + \binom{5}{1} 2^4 + \binom{5}{2} 2^3 + \binom{5}{3} 2^2 + \binom{5}{4} 2^1 + \binom{5}{5} 2^0$

$2^5 + 5 \cdot 2^4 + 10 \cdot 2^3 + 10 \cdot 2^2 + 5 \cdot 2 + 1 = 243$//

alternativa (C)//