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Lista de Exercícios - Aula 11

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1 - $(1+2x^2)^6$ / coeficiente de x^8 = ?

Linha 6: $\binom{6}{k} \cdot 1^{6-k} \cdot (2x^2)^k$

$\binom{6}{k} \cdot 1^{6-k} \cdot 2^k \cdot x^{2k}$

$2k = 8$

$k = \frac{8}{2}$

$k = 4$

$\binom{6}{4} \cdot 1^{6-4} \cdot 2^4 \cdot x^{2\cdot 4}$

$\frac{6!}{4!\,(6-4)!} \cdot 1^2 \cdot 16 \cdot x^8$

$\frac{\overset{3}{\cancel{6}} \cdot 5 \cdot \cancel{4!}}{\cancel{4!} \cdot \cancel{2} \cdot 1} \cdot 16\,x^8$

$15 \cdot 16\,x^8$

$240\,x^8$

Alternativa C

2 - $(14x - 13y)^{237}$ / Soma de todos coeficientes = ? / $x = 1$ / $y = 1$

$(14 - 13)^{237} \rightarrow 1^{237} \rightarrow 1$ Alternativa B.

3- $(x+a)^{11}$ / $1386\,x^{5}$ / $a=?$

Linha 11 : $\binom{11}{k} \cdot x^{\boxed{11-k}} \cdot a^{k}$

$11-k=5$

$k=11-5$

$k=6$

$\binom{11}{6} \cdot x^{11-6} \cdot a^{6} = 1386x^{5}$

$\frac{11!}{6!\,(11-6)!} \cdot x^{5} \cdot a^{6} = 1386x^{5}$

$\frac{11 \cdot \cancel{10} \cdot 9 \cdot \cancel{8} \cdot 7 \cdot \cancel{6!}}{\cancel{6!} \cdot \cancel{5} \cdot 4 \cdot \cancel{3} \cdot \cancel{2} \cdot 1} \cdot \frac{\cancel{x^{6}}}{\cancel{x^{5}}} \cdot a^{6} = 1386$

$462\,a^{6} = 1386$

$a^{6} = \frac{1386}{462}$

$a^{6} = 3$

$a = \sqrt[6]{3}$

Alternativa A.

4- $\left(x + \frac{1}{x^{2}}\right)^{9}$ / termo independente $= ?$ (x^{0})

$(x + x^{-2})^{9}$

$\binom{9}{0} x^{9-0} \cdot (x^{-2})^{0} + \binom{9}{1} x^{9-1} \cdot (x^{-2})^{1} + \binom{9}{2} x^{9-2} \cdot (x^{-2})^{2} + \binom{9}{3} x^{9-3} \cdot (x^{-2})^{3} + \dots$

$\binom{9}{0} x^{9} \cdot x^{0} + \binom{9}{1} x^{8} \cdot x^{-2} + \binom{9}{2} x^{7} \cdot x^{-4} + \binom{9}{3} x^{6} \cdot x^{-6} + \dots$

$\binom{9}{0} x^{9} + \binom{9}{1} x^{6} + \binom{9}{2} x^{3} + \binom{9}{3} x^{0}$ } termo independente (x^{0})

Alternativa D $\binom{9}{3}$

5- $\left(x + \frac{1}{x^2}\right)^n$ / $n = ?$ / tem termo independente

$(x + x^{-2})^n$

Termo independente (x^0)

Linha n : $\binom{n}{k} \cdot x^{n-k} \cdot (x^{-2})^k$

$n - k - 2k = 0$

$n - 3k = 0$

$n = 3k$

$\binom{n}{k} x^{n-k} \cdot x^{-2k}$

$k = \frac{n}{3}$

K, um número natural, é igual a n dividido por 3, logo podemos concluir que n é divisível por 3. → Alternativa C

Se n é divisível por 3.

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

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

$(3x^3)^2 (2x^{-2})^3 + \binom{5}{4} (3x^3)^1 (2x^{-2})^4 + \binom{5}{5} (3x^5)^0 (2x^{-2})^5 = 243x^{15} + 810x^{10} + 1080x^5 +$

$+ 720 + \frac{240}{x^5} + \frac{32}{x^{10}}$

$K = 243x^{15} + 810x^{10} + 1080x^5 + 720 + \frac{240}{x^5} + \frac{32}{x^{10}} - \left(243x^{15} + 810x^{10} + 1080x^5 + \frac{240}{x^5} + \frac{32}{x^{10}}\right)$

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

$K = 720$ → Alternativa E

7- $(2x + y)^5$ / Soma coeficientes = ?

$x = 1$ / $y = 1$

$(2+1)^5 = 3^5 = 243$ Alternativa C