

Teorema do Binômio:

1.

① $(1+2x^2)^6$ linha 6 = 1 6 15 20 15 6 1

$$(1 \cdot 1^6 \cdot (2x^2)^0) + (6 \cdot 1^5 \cdot (2x^2)^1) + (15 \cdot 1^4 \cdot (2x^2)^2) + (20 \cdot 1^3 \cdot (2x^2)^3) + (15 \cdot 1^2 \cdot (2x^2)^4) + (6 \cdot 1^1 \cdot (2x^2)^5) + (1 \cdot 1^0 \cdot (2x^2)^6)$$
$$(1 \cdot 1) + (6 \cdot 2x^2) + (15 \cdot 4x^4) + (20 \cdot 8x^6) + (15 \cdot 16x^8) + (6 \cdot 32x^{10}) + (1 \cdot 64x^{12})$$
$$1 + 12x^2 + 60x^4 + 160x^6 + 240x^8 + 192x^{10} + 64x^{12}$$

R: C) 240

R: c) 240

2.

② $((14)x - (13)y)^{237}$

soma dos coeficientes $\rightarrow 14 - 13 = 1$

$$(1)^{237} = 1$$

R: B) 1

R: b) 1

3.

$$\textcircled{3} (x+a)^{11} = 1386x^5 \quad \binom{11}{6} x^5 \cdot a^6 = 1386 \rightarrow \frac{11!}{6! \cdot (11-6)!} \rightarrow \frac{11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{5! \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$$

$$\frac{11 \cdot 10 \cdot 9 \cdot 8 \cdot 7}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} \rightarrow \frac{55440}{120} = 462$$

$$462x^5 \cdot a^6 = 1386x^5$$

$$a^6 = \frac{1386x^5}{462x^5}$$

$$a^6 = 3$$

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

R: A) $\sqrt[6]{3}$

R: a) $\sqrt[6]{3}$

4.

$$\textcircled{4} \left(\frac{x+1}{x^2} \right)^9 \rightarrow (x+1 \cdot x^{-2})^9 \text{ linha 9} = 1 \ 9 \ 36 \ 84 \ 126 \ 126 \ 84 \ 36 \ 9 \ 1$$

$$(1 \cdot x^9 \cdot (x^{-2})^0) + (9x^8 \cdot (x^{-2})^1) + (36x^7 \cdot (x^{-2})^2) + (84x^6 \cdot (x^{-2})^3) + (126x^5 \cdot (x^{-2})^4) +$$

$$(126x^4 \cdot (x^{-2})^5) + (84x^3 \cdot (x^{-2})^6) + (36x^2 \cdot (x^{-2})^7) + (9x^1 \cdot (x^{-2})^8) + (1 \cdot x^0 \cdot (x^{-2})^9)$$

$$\downarrow$$

$$x^9 + 9x^6 + 36x^3 + \textcircled{84} + 126x^{-3} + 126x^{-6} + 84x^{-9} + 36x^{-12} + 9x^{-15} + x^{-18}$$

$$\binom{9}{0} = 1 \quad \binom{9}{3} = \frac{9!}{3! \cdot (9-3)!} \rightarrow \frac{9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{3! \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} \rightarrow \frac{9 \cdot 8 \cdot 7}{3 \cdot 2 \cdot 1}$$

$$\binom{9}{1} = 9$$

$$\binom{9}{2} = 36$$

$$\frac{504}{6} = 84$$

R: D) $\binom{9}{3}$

R: d) $\binom{9}{3}$

5.

$$\textcircled{5} \left(\frac{x+1}{x^2} \right)^m \rightarrow (x + 1 \cdot x^{-2})^m \quad \binom{m}{k} x^{m-k} (1x^{-2})^k$$

$$\binom{m}{k} x^{m-k} x^{-2k}$$

$$m - k - 2 \cdot k = 0$$

$$m = 3k$$

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

$R: \mathbb{C}$ se m é divisível por 3

R: c) se n é divisível por 3.

6.

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

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

linha 5 = 1 5 10 10 5 1

$$(1 \cdot (3x^3)^5 \cdot (2x^{-2})^0) + (5 \cdot (3x^3)^4 \cdot (2x^{-2})^1) + (10 \cdot (3x^3)^3 \cdot (2x^{-2})^2) + (10 \cdot (3x^3)^2 \cdot (2x^{-2})^3) + (5 \cdot (3x^3)^1 \cdot (2x^{-2})^4) + (1 \cdot (3x^3)^0 \cdot (2x^{-2})^5)$$

$$\downarrow$$

$$(\cancel{243x^{15}} + \cancel{810x^{10}} + \cancel{1080x^5} + 720 + \cancel{240x^{-5}} + \cancel{32x^{-10}})$$

$$(\cancel{243x^{15}} + \cancel{810x^{10}} + \cancel{1080x^5} + \cancel{240x^{-5}} + \cancel{32x^{-10}})$$

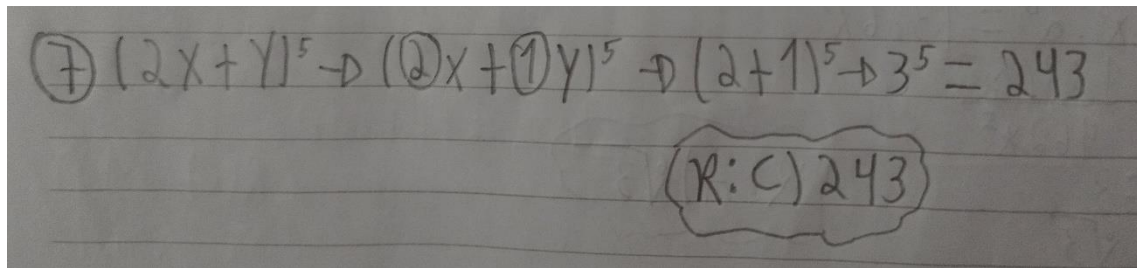
$$=$$

$$720$$

$R: \mathbb{E} | 720$

R: e) 720

7.



A photograph of a piece of lined paper with handwritten mathematical work. The first line shows the expression $(2x+y)^5$ with a circled 7 to its left. This is followed by an arrow pointing to $(2x+1y)^5$, where the 1 is circled. Another arrow points to $(2+1)^5$, and a final arrow points to $3^5 = 243$. The second line shows the result $(R:C) 243$ enclosed in a hand-drawn cloud-like border.

$$\textcircled{7} (2x+y)^5 \rightarrow (2x+\textcircled{1}y)^5 \rightarrow (2+1)^5 \rightarrow 3^5 = 243$$
$$(R:C) 243$$

R: c) 243