Taller Matemáticas - mayo

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1. Productos Notables

a. $\left(\frac{2}{7}mn + \frac{1}{3}np\right)^3$

Solución

Es una suma de cuadrados de la forma

$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$donde \begin{cases} a = \frac{2}{7}mn \\ \\ b = \frac{1}{3}np \end{cases}$$

$$\begin{aligned}
\left(\frac{2}{7}mn + \frac{1}{3}np\right)^3 &= \left(\frac{2}{7}mn\right)^3 + 3\left(\frac{2}{7}mn\right)^2\left(\frac{1}{3}np\right) + 3\left(\frac{2}{7}mn\right)\left(\frac{1}{3}np\right)^2 + \left(\frac{1}{3}np\right)^3 \\
&= \left(\frac{2^3}{7^3}m^3n^3\right) + 3\left(\frac{2^2}{7^2}m^2n^2\right)\left(\frac{1}{3}np\right) + 3\left(\frac{2}{7}mn\right)\left(\frac{1^2}{3^2}n^2p^2\right) + \left(\frac{1^3}{3^3}n^3p^3\right) \\
&= \left(\frac{2\cdot 2\cdot 2}{7\cdot 7\cdot 7}m^3n^3\right) + 3\left(\frac{2\cdot 2}{7\cdot 7}m^2n^2\right)\left(\frac{1}{3}np\right) + 3\left(\frac{2}{7}mn\right)\left(\frac{1\cdot 1}{3\cdot 3}n^2p^2\right) + \left(\frac{1\cdot 1\cdot 1}{3\cdot 3\cdot 3}n^3p^3\right) \\
&= \left(\frac{8}{343}m^3n^3\right) + 3\left(\frac{4}{49}m^2n^2\right)\left(\frac{1}{3}np\right) + 3\left(\frac{2}{7}mn\right)\left(\frac{1}{9}n^2p^2\right) + \left(\frac{1}{27}n^3p^3\right) \\
&= \frac{8}{343}m^3n^3 + \frac{\cancel{3}\cdot 4}{49}m^2n^2\left(\frac{1}{\cancel{3}}np\right) + \frac{\cancel{3}\cdot 2}{7}mn\left(\frac{1}{\cancel{9}}n^2p^2\right) + \frac{1}{27}n^3p^3 \\
&= \frac{8}{343}m^3n^3 + \frac{4}{49}m^2n^2np + \frac{2}{7}mn\left(\frac{1}{3}n^2p^2\right) + \frac{1}{27}n^3p^3 \\
&= \frac{8}{343}m^3n^3 + \frac{4}{49}m^2n^2np + \frac{2}{21}mnn^2p^2 + \frac{1}{27}n^3p^3 \\
&= \frac{8}{343}m^3n^3 + \frac{4}{49}n^3m^2p + \frac{2}{21}n^3p^2m + \frac{1}{27}n^3p^3
\end{aligned}$$

Rta/

$$\left(\frac{2}{7}mn + \frac{1}{3}np\right)^3 = \frac{8}{343}m^3n^3 + \frac{4}{49}n^3m^2p + \frac{2}{21}n^3p^2m + \frac{1}{27}n^3p^3$$

b. $\left(\frac{1}{2}pq^2 + \frac{2}{3}p^2q\right)^2$

c. $\left(\frac{2}{5}xn + \frac{1}{3}ny\right)^2$

d. $\left(\frac{5}{12}mq^3 - \frac{1}{9}p^2q\right)^2$

e. $\left(\frac{3}{7}xnm + \frac{2}{9}nmy\right)^2$

f. $\left(\frac{3}{7}xnm + \frac{2}{9}nmy\right)\left(\frac{3}{7}xnm - \frac{2}{9}nmy\right)$

g. $\left(\frac{2}{5}xn + \frac{1}{3}ny\right)\left(\frac{2}{5}xn + \frac{1}{3}ny\right)$

h. $(2a - 3b + 4c)^2$

i. $\left(2 + 3x - 5x^2\right)^2$