COMBINATORIA

Problema 15:

Resolver la ecuación:

$$\binom{x}{2} + 3\binom{x-1}{2} = 91$$

Solución Problema 15:

$$\binom{x}{2} + 3\binom{x-1}{2} = 91 \quad ecuación\ 1$$

La ecuación 1 la podemos poner como:

$$C_{x,2} + 3\,C_{x-1,2} = 91$$

Operando sobre ella

$$\frac{V_{x,2}}{P_2} + 3\frac{V_{x-1,2}}{P_2} = 91$$

$$\frac{\mathrm{x}(\mathrm{x}-1)}{2} + 3\frac{(\mathrm{x}-1)(\mathrm{x}-2)}{2} = 91$$

$$\mathrm{x}(\mathrm{x}-1) + 3(\mathrm{x}-1)(\mathrm{x}-2) = 182$$

$$x^2 - x + 3(x^2 - x - 2x + 2) = 182$$

$$x^2 - x + 3x^2 - 9x + 6 = 182$$

$$4x^2 - 10x - 176 = 0$$

Simplificando por 2:

$$2x^2 - 5x - 88 = 0$$

$$\mathrm{x} = \frac{5 \pm \sqrt{5^2 + 4\mathrm{x}2\mathrm{x}88}}{4} = \frac{5 \pm \sqrt{25 + 704}}{4} = \frac{5 \pm \sqrt{729}}{4} = \frac{5 \pm 27}{4}$$

$$\boldsymbol{x_1} = \frac{5 + 27}{4} = \frac{32}{4} = \mathbf{8}\ \boldsymbol{solución\ válida}$$

$$\boldsymbol{x_2} = \frac{5 - 27}{4} = \frac{-22}{4} = \frac{\mathbf{-11}}{\mathbf{2}}\ \boldsymbol{solución\ válida}$$