COMBINATORIA

Problema 85:

Hallar los valores de x que satisfacen a:

$$18 \binom{x}{2} + 24 \binom{x}{3} = 125x$$

Solución Problema 85:

$$18 \binom{x}{2} + 24 \binom{x}{3} = 125x$$

$$18 \frac{x(x-1)}{2 \cdot 1} + 24 \frac{x(x-1)(x-2)}{3 \cdot 2 \cdot 1} = 125x$$

$$9x(x-1) + 4x(x-1)(x-2) = 125x$$

$$9x - 9 + 4(x^2 - x - 2x + 2) = 125$$

$$9x - 9 + 4(x^2 - 3x + 2) = 125$$

$$9x - 9 + 4x^2 - 12x + 8 = 125$$

$$4x^2 - 3x - 126 = 0$$

$$x = \frac{3 \pm \sqrt{9 + 2016}}{8} = \frac{3 \pm \sqrt{2025}}{8} = \frac{3 \pm 45}{8}$$

$$x_1 = \frac{3 + 45}{8} = \frac{48}{8} = 6$$

$$x_2 = \frac{3 - 45}{8} = \frac{-42}{8} = \frac{-21}{4}$$