

**Mengenang Jejak Sebagian Kecil Bangsa Indonesia Yang Pernah  
Mengikuti Ujian Sekolah Pada Masa Silam  
UJIAN PENGHABISAN SEKOLAH MENENGAH TINGKAT ATAS  
TAHUN 1925**

## ALJABAR

**1. HBS (Hogere Burger School) Nederland, 1925**

Carilah  $x$  dan  $y$  dari kedua persamaan yang berikut ini:

$$I: 3^{x-y-1} + 3^{3-x+y} = {}^7\log 343^3 + \frac{{}^P\log 256}{{}^P\log 4 \times {}^P\log 4}$$

$$II: {}^6\log(6^{2x+3y} - 8) + 2x + 3y = {}^6\log 105$$

**Solusi:**

$$3^{x-y-1} + 3^{3-x+y} = {}^7\log 343^3 + \frac{{}^P\log 256}{{}^P\log 4 \times {}^P\log 4}$$

$$3^{x-y-1} + 3^{3-x+y} = {}^7\log(7^3)^3 + \frac{{}^P\log 4^4}{4 \times {}^P\log 4}$$

$$3^{x-y-1} + 3^{3-x+y} = {}^7\log 7^9 + \frac{4^P \log 4}{4 \times {}^P\log 4}$$

$$\frac{3^{x-y}}{3} + \frac{27}{3^{x-y}} = 10$$

$$(3^{x-y})^2 - 30 \times 3^{x-y} + 81 = 0$$

$$(3^{x-y} - 3)(3^{x-y} - 27) = 0$$

$$3^{x-y} = 3 \vee 3^{x-y} = 27 = 3^3$$

$$x - y = 1 \vee x - y = 3$$

$$y = x - 1 \dots (1) \text{ atau } y = x - 3 \dots (2)$$

$${}^6\log(6^{2x+3y} - 8) + 2x + 3y = {}^6\log 105$$

$${}^6\log(6^{2x+3y} - 8) + {}^6\log 6^{2x+3y} = {}^6\log 105$$

$${}^6\log(6^{2x+3y} - 8)6^{2x+3y} = {}^6\log 105$$

$${}^6\log(6^{4x+6y} - 8 \times 6^{2x+3y}) = {}^6\log 105$$

$$6^{4x+6y} - 8 \times 6^{2x+3y} = 105$$

$$6^{4x+6y} - 8 \times 6^{2x+3y} - 105 = 0$$

$$(6^{2x+3y} + 7)(6^{2x+3y} - 15) = 0$$

$$6^{2x+3y} + 7 = 0 \vee 6^{2x+3y} - 15 = 0$$

$$6^{2x+3y} = -7(\text{ditolak}) \vee 6^{2x+3y} = 15(\text{diterima})$$

$$\log 6^{2x+3y} = \log 15$$

$$(2x + 3y)\log 6 = \log 15$$

$$2x + 3y = {}^6\log 15 \dots (3)$$

Dari persamaan (1) dan (3) diperoleh

$$2x + 3(x-1) = {}^6\log 15$$

$$2x + 3x - 3 = {}^6\log 15$$

$$5x = 3 + {}^6\log 15$$

$$x_1 = \frac{3 + {}^6\log 15}{5}$$

$$y_1 = \frac{3 + {}^6\log 15}{5} - 1 = \frac{-2 + {}^6\log 15}{5}$$

Dari persamaan (2) dan (3) diperoleh

$$2x + 3(x-3) = {}^6\log 15$$

$$2x + 3x - 9 = {}^6\log 15$$

$$5x = 9 + {}^6\log 15$$

$$x_2 = \frac{9 + {}^6\log 15}{5}$$

$$y_2 = \frac{9 + {}^6\log 15}{5} - 3 = \frac{-6 + {}^6\log 15}{5}$$

Bersambung...