

## Aufgabe 5a

$$L(u, v, w, \lambda_1, \lambda_2) = 4u + 3v + w + \lambda_1(uv - 6) + \lambda_2(vw - 24)$$

$$\text{I } L_u = 4 + \lambda_1 v = 0$$

$$\text{II } L_v = 3 + \lambda_1 u + \lambda_2 w = 0$$

$$\text{III } L_w = 1 + \lambda_2 v = 0$$

$$\text{IV } L_{\lambda_1} = uv - 6 = 0$$

$$\text{V } L_{\lambda_2} = vw - 24 = 0$$

$$\text{Aus I: } \lambda_1 = -\frac{4}{v} \quad \text{in II: } 3 - \frac{4u}{v} - \frac{w}{v} = 0 \quad | \cdot v$$

$$\text{Aus III: } \lambda_2 = -\frac{1}{v}$$

$$\text{Aus IV: } u = \frac{6}{v} \quad *$$

$$\text{Aus V: } w = \frac{24}{v} \quad *$$

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$$3v - \frac{24}{v} - \frac{24}{v} = 0 \quad | \cdot v$$

$$3v^2 - 48 = 0 \quad | :3$$

$$v^2 = 16$$

$$v_{1/2} = \pm 4$$

$$v_1 = 4 \quad u = \frac{6}{4} = \frac{3}{2} \quad w = \frac{24}{4} = 6$$

$$\text{Kandidat 1: } \left( \frac{3}{2}, 4, 6 \right)$$

$$v_2 = -4 \quad u = -\frac{3}{2} \quad w = -6$$

$$\text{Kandidat 2: } \left( -\frac{3}{2}, -4, -6 \right)$$