

Aufgabe 16:

direkte Integration:

$$I_{yy} = \int x^2 dA = \int dA \cdot y dx = 2 \int_0^b x^2 y(x) dx =$$

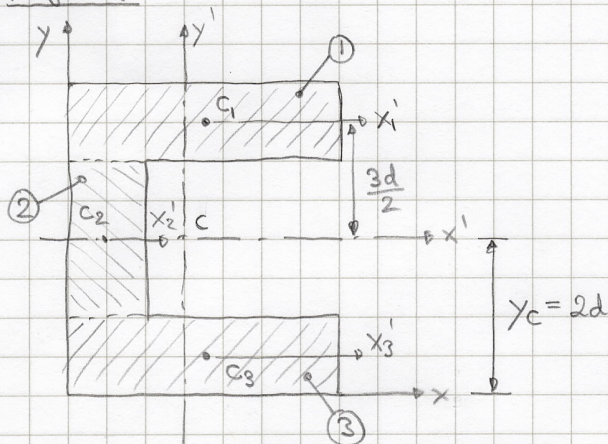
wobei  $y(x) = h \sqrt{1 - \frac{x}{b}}$

Tabelle

$$I_{yy} = 2 \int_0^b x^2 h \sqrt{1 - \frac{x}{b}} dx = 2h \int_0^b x^2 \sqrt{1 - \frac{x}{b}} dx = 2h \left[ -\frac{2}{105} (b-x) \sqrt{1 - \frac{x}{b}} (8b^2 + 12bx + 15x^2) \right]_0^b$$

$$= 2h \left[ \frac{2}{105} b \sqrt{1 - \frac{0}{b}} 8b^2 \right] = \frac{4hb}{105} 8b^2 = \frac{32}{105} hb^3 = \underline{\underline{2.44 \text{ m}^4}}$$

Aufgabe 17:



$$I_{x'x'}^{(1)} = I_{x'_1x'_1}^{(1)} + d \cdot 4d \cdot \left(\frac{3d}{2}\right)^2 = \frac{1}{12} 4d d^3 + 4d^2 \frac{9d^2}{4} = \frac{1}{3} d^4 + \frac{27}{3} d^4 = \underline{\underline{\frac{28}{3} d^4}}$$

$$I_{x'x'}^{(2)} = I_{x'_2x'_2}^{(2)} = \frac{1}{12} d (2d)^3 = \frac{8}{12} d^4 = \underline{\underline{\frac{4}{6} d^4}}$$

$$I_{x'x'}^{(3)} = I_{x'_1x'_1}^{(1)} = \underline{\underline{\frac{28}{3} d^4}}$$

Summe:  $\underline{\underline{I_{x'x'}}} = 2 \underline{\underline{I_{x'_1x'_1}^{(1)}}} + I_{x'_2x'_2}^{(2)} = \frac{56}{3} d^4 + \frac{4}{6} d^4 = \frac{116}{6} d^4 = \underline{\underline{\frac{58}{3} d^4}} = \underline{\underline{49.49 \cdot 10^6 \text{ mm}^4}}$