1) a) $E = 9'999\ N/mm^2 \simeq 10'000\ N/mm^2$

$G = 4'286\ N/mm^2 \simeq 4'300\ N/mm^2$

$\nu = 0,17$

b) $30\ N/mm^2$

c) $2,7\ kN$ alternativ: $2,25\ kN$

d) Normalspannung σ_x: $-16,7\ N/mm^2$ / $+16,7\ N/mm^2$ Schubspannung τ_{zx}: $\tau_{max} = 0,5\ N/mm^2$

2) a) $M_{B,min} = \frac{-QL}{2} + \frac{-3qL^2}{8} = \frac{-7qL^2}{8} = \frac{-7QL}{8}$

b) $V_B = Q + qL = 2qL = 2Q$

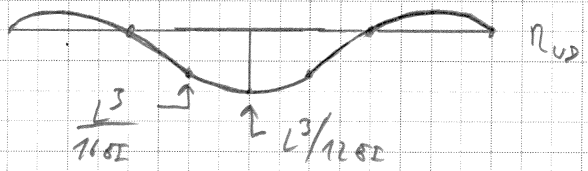
$V_F = \frac{qL}{4} = \frac{Q}{4}$

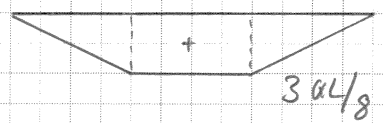
$M_F = \frac{-qL^2}{4} = \frac{-QL}{4}$

c) $A_v^+ = G_v^+ = Q + \frac{qL}{2} = \frac{3qL}{2} = \frac{3Q}{2}$

$A_r^- = G_v^- = \frac{-Q}{2} + \frac{-3qL}{8} = \frac{-7qL}{8} = \frac{-7Q}{8}$

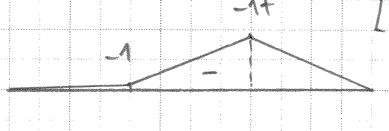
d) nein, es gibt keine abhebenden Kräfte

e) 

3) a) 

$M(Q,\ P_0 = 0)$

b) $P_0 = \frac{3Q}{2}$

c) 

$[QL/48]$

$M_{bal}\left(Q_{t.L.w.},\ P_0 = \frac{3Q}{2}\right)$

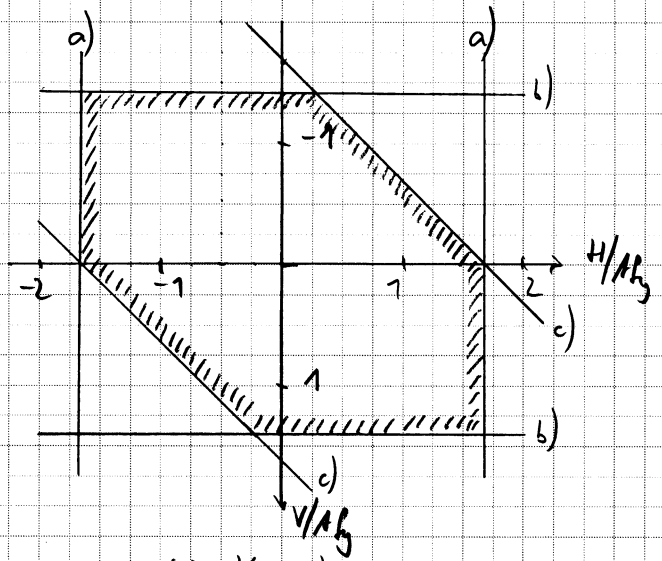
Korr. SV 21.6.201 Aufg. 5b

4) a) $\frac{-A_{fg}}{2}(2+\sqrt{2}) \le H \le \frac{A_{fg}}{2}(2+\sqrt{2})$

b) $-\sqrt{2}\,A_{fg} \le V \le \sqrt{2}\,A_{fg}$

c) $\frac{-A_{fg}}{2}(2+\sqrt{2}) \le V-H \le \frac{A_{fg}}{2}(2+\sqrt{2})$

d)



5) a) $\varphi(x) = \frac{Qx(l-x)(l-2x)}{3EI\,l}$

b) $M_B(x) = \frac{-2Qx(l-x)(l-2x)}{3x^2-l^2}$

Bemerkung $\varphi \equiv 0$ kann nicht erreicht werden mit dem aufgebrachten Endmoment.

6) a) $\overline{f_k} = \frac{12\,EI}{l^2(4k^2+4k+1)}$

b) $\overline{f_\varepsilon} = \frac{\pi^2 EI}{l^2}$; $\overline{F_k} = \frac{12\,EI}{l^2}$; Abweichung: $\frac{\pi^2}{12} \approx 0{,}82$

Linear und parabolisch angenommene Knickkurve durch Realkurven ersetzen.

c) $\overline{f_k} = \frac{\pi^2 EI}{4k^2 l^2}$

d) $w_{tot} = 126{,}3$ mm

$\sigma_{extr} = \begin{cases} -332 \text{ N/mm}^2 \\ 95 \text{ N/mm}^2 \end{cases}$, extremale Randspannungen bei Lager B.