Remarks: See §4.4, pages 168 till 170
See §4.6, pages 184 till 186

Hint:

Decompose the stress diagram into two in $\sigma^{(N)}(=\sigma_{\text{NC}})$ and $\sigma^{(M)}$.

This gives $N = A\sigma_{\text{NC}}$ and $M = W\sigma^{(M)}_{\text{max}}$ where $\sigma^{(M)}_{\text{max}} = \left|\sigma_{\text{max}} - \sigma_{\text{NC}}\right|$.

The correct bending symbol is obtained from the bending stress diagram.

$\sigma^{(M)} = \sigma - \sigma_{\text{NC}}$

Answers 4.75-1:

a. $N = -72$ kN

b. $M = 2,4$ kNm $(\smile)$

Explanation 4.75-1:

$A = 12\times10^3$ mm^2 and $W = 400\times10^3$ mm^3

a. $\sigma_{\text{NC}} = -6$ N/mm^2

b. $\sigma^{(M)}_{\text{max}} = \left|(-12\text{ N/mm}^2) - (-6\text{ N/mm}^2)\right| = 6$ N/mm^2

Answers 4.75-2:

a. $N = +240$ kN

b. $M = 27,5$ kNm $(\smile)$

Explanation 4.75-2:

$A = 30\times10^3$ mm^2 and $W = 1,25\times10^6$ mm^3

a. $\sigma_{\text{NC}} = +8$ N/mm^2

b. $\sigma^{(M)}_{\text{max}} = \left|(+30\text{ N/mm}^2) - (+8\text{ N/mm}^2)\right| = 22$ N/mm^2

Hint:

Decompose the stress diagram into two in $\sigma^{(N)}(=\sigma_{NC})$ and $\sigma^{(M)}$.

This gives $N = A\sigma_{NC}$ and $M = W\sigma_{max}^{(M)}$ where $\sigma_{max}^{(M)} = \left|\sigma_{max} - \sigma_{NC}\right|$.

The correct bending symbol is obtained from the bending stress diagram.

$\sigma^{(M)} = \sigma - \sigma_{NC}$

Answers 4.75-3:

a. $N = -54$ kN

b. $M = 1{,}125$ kNm $(\frown)$

Explanation 4.75-3:

$A = 9\times10^3$ mm^2 and $W = 225\times10^3$ mm^3

a. $\sigma_{NC} = -6$ N/mm^2

b. $\sigma_{max}^{(M)} = \left|(-10\text{ N/mm}^2) - (-6\text{ N/mm}^2)\right| = 4$ N/mm^2

Answers 4.75-4:

a. $N = -24{,}96$ kN

b. $M = 2{,}0$ kNm $(\frown)$

Explanation 4.75-4:

$A = 9{,}6\times10^3$ mm^2 and $W = 256\times10^3$ mm^3

a. $\sigma_{NC} = -2{,}6$ N/mm^2

b. $\sigma_{max}^{(M)} = \left|(-10{,}4\text{ N/mm}^2) - (2{,}6\text{ N/mm}^2)\right| = 7{,}8$ N/mm^2