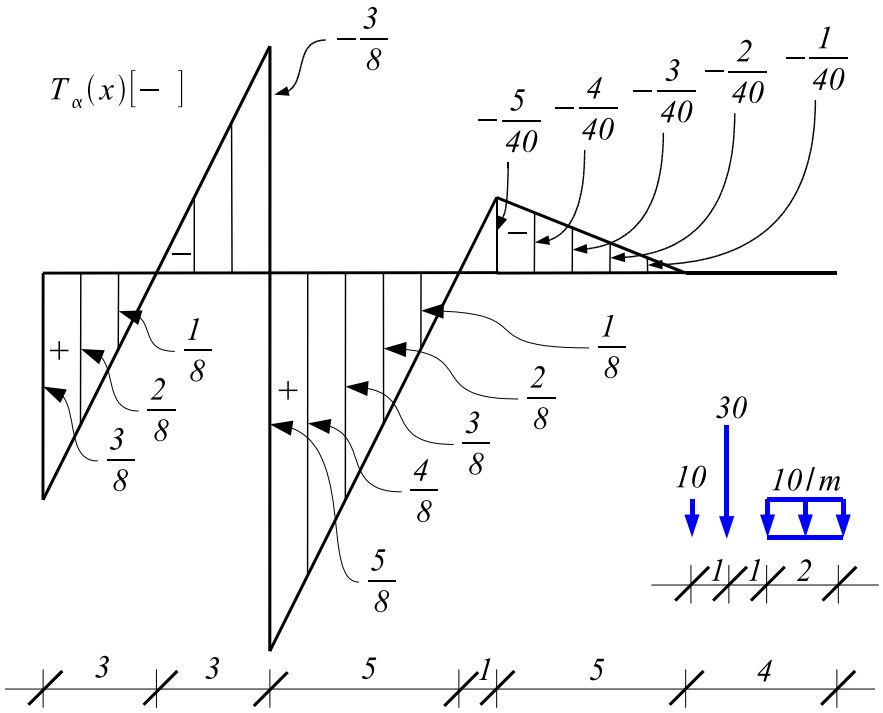
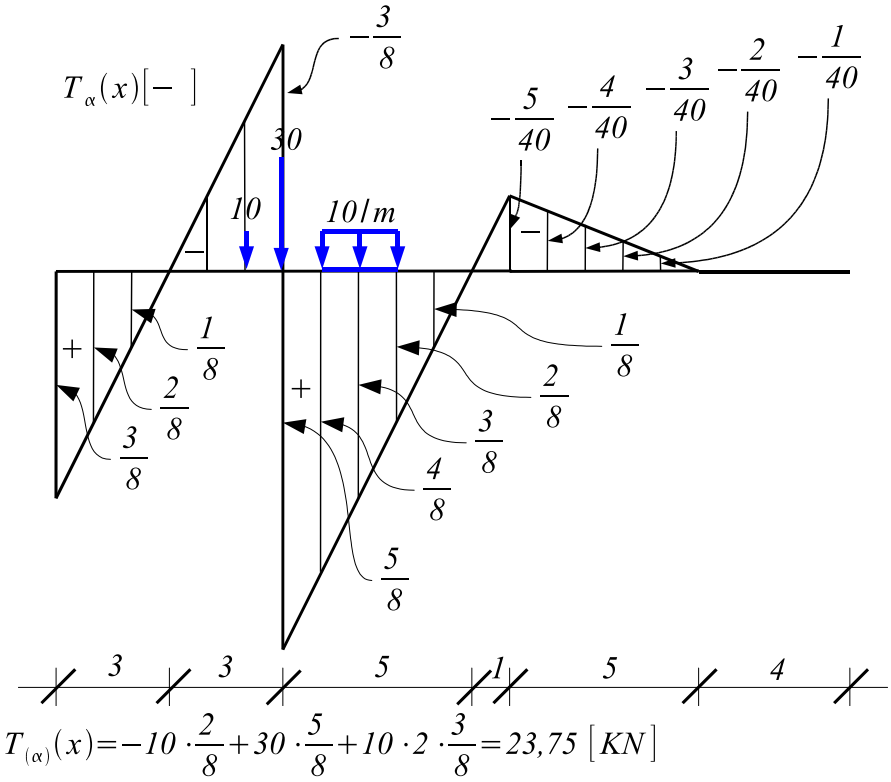
Znaleźć ekstremalne wartości siły T_α z części pierwszej projektu przy zadanym obciążeniu [kN]:



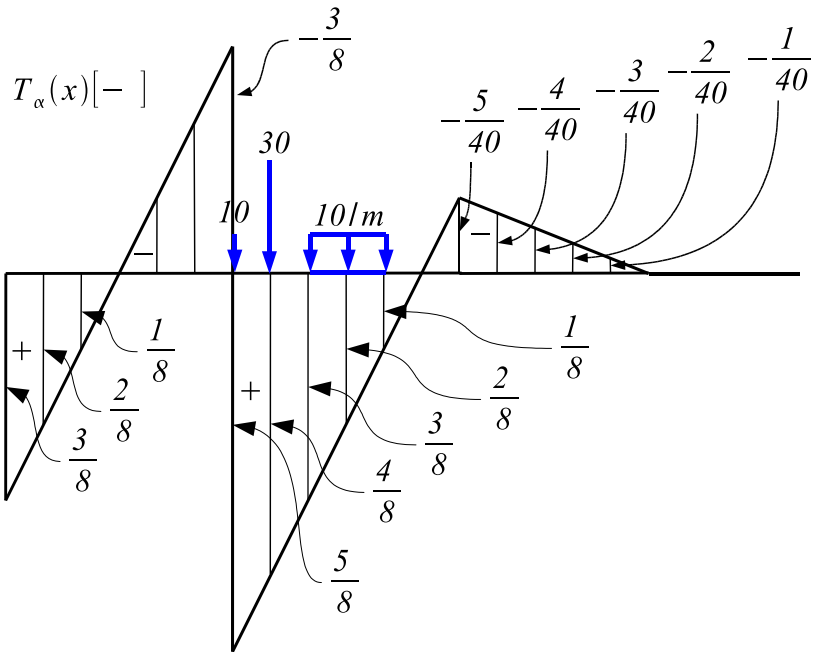
Szukam $T_\alpha(x)_{max}$:

1. położenie 1:



$$T_{(\alpha)}(x) = -10 \cdot \frac{2}{8} + 30 \cdot \frac{5}{8} + 10 \cdot 2 \cdot \frac{3}{8} = 23{,}75\ [KN]$$

2. położenie 2:

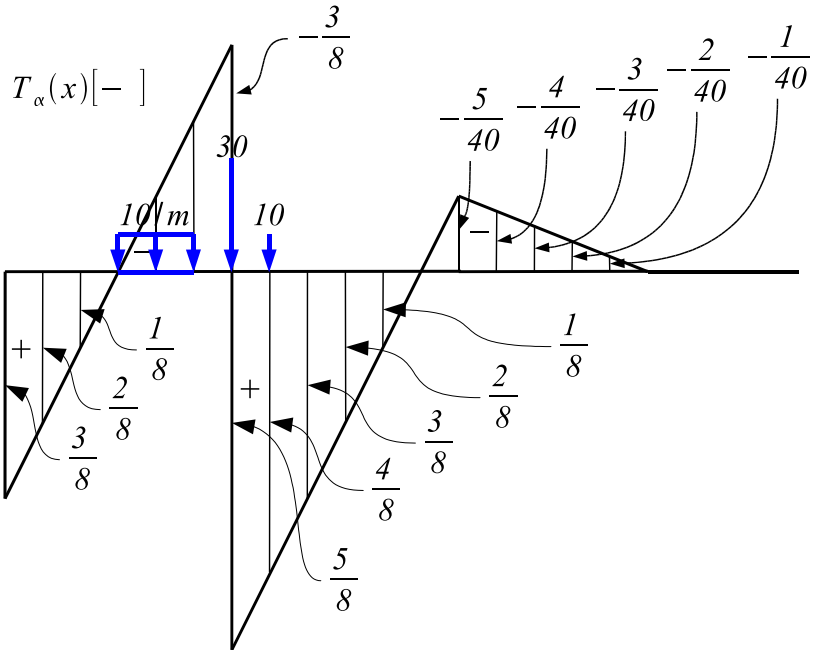


$$T_{(\alpha)}(x)=10\cdot\frac{5}{8}+30\cdot\frac{4}{8}+10\cdot 2\cdot\frac{2}{8}=26{,}25\ [KN]$$

Czyli: $T_{(\alpha)}(x)_{max}=26{,}25\ [KN]$

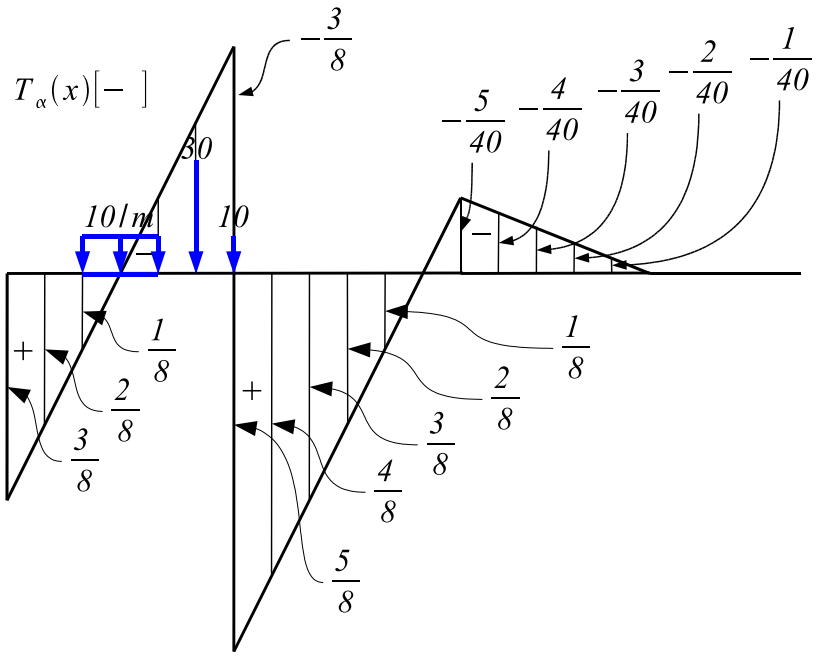
Szukam $T_\alpha(x)_{min}$:

1. położenie 1:



$$T_{(\alpha)}(x)=10\cdot\frac{4}{8}-30\cdot\frac{3}{8}-10\cdot 2\cdot\frac{1}{8}=-8{,}75\ [KN]$$

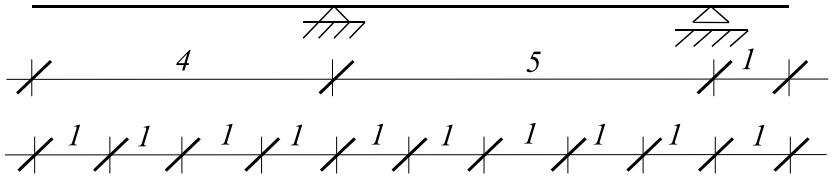
2. położenie 2:



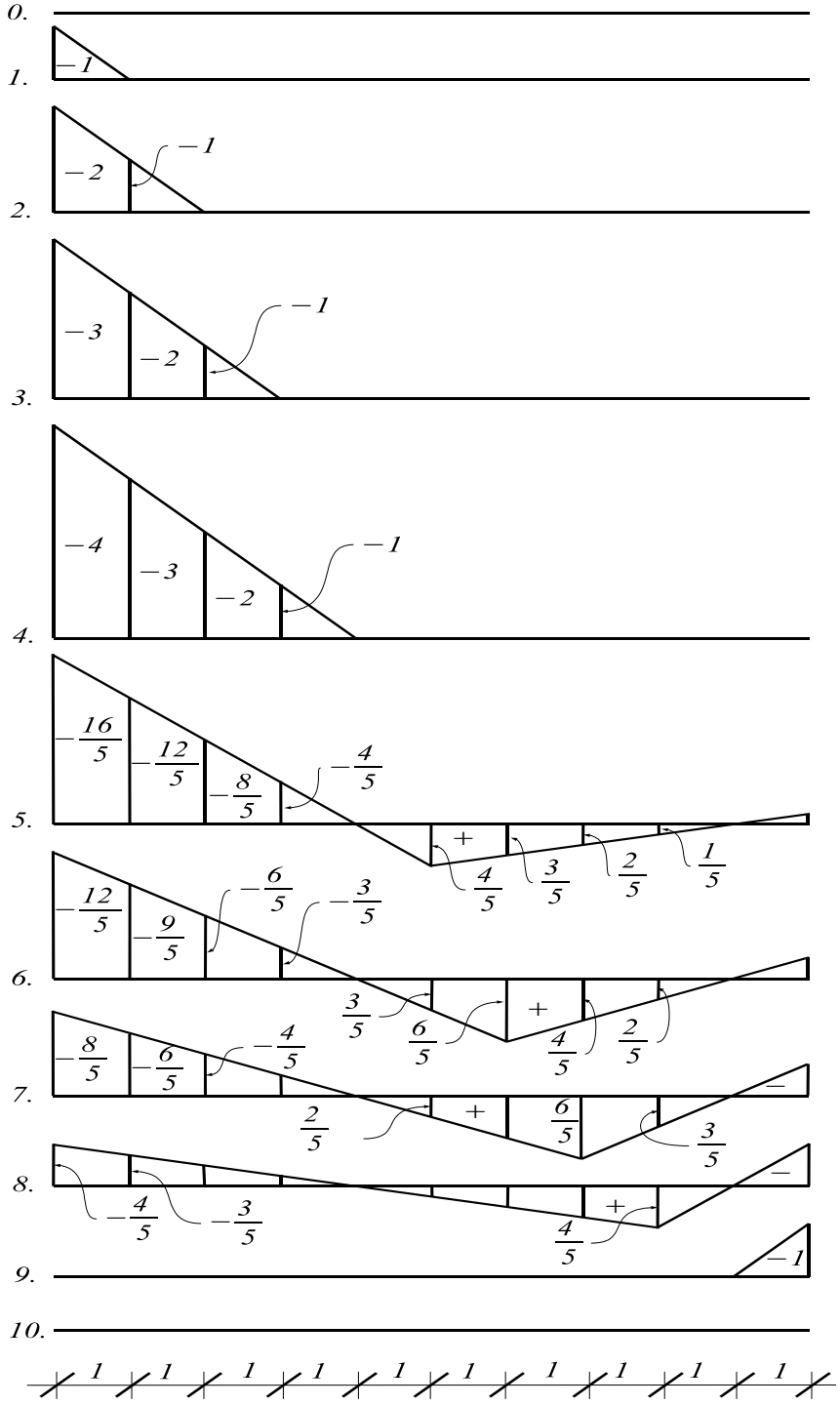
$$T_{(\alpha)}(x) = -10 \cdot \frac{3}{8} - 30 \cdot \frac{2}{8} - 0 = -11{,}25\ [KN]$$

Czyli: $T_{(\alpha)}(x)_{min} = -11{,}25\ [KN]$

Znaleźć ekstremalne wartości Momentu zginającego dla belki na rysunku przy zadanym obciążeniu (jak wyżej), naszkicować obwiednię momentów:



linie wpływowe momentów w przekrojach co 1 metr [m]:



0. $M_{min}=M_{max}=0\ [KNm]$

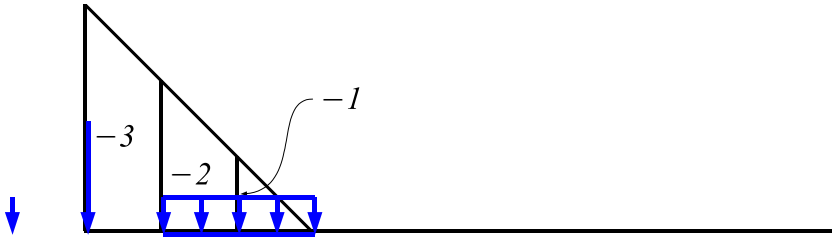
1.

$M_{max}=0\ [KNm] \quad M_{min}=-30\cdot 1=-30\ [KNm]$

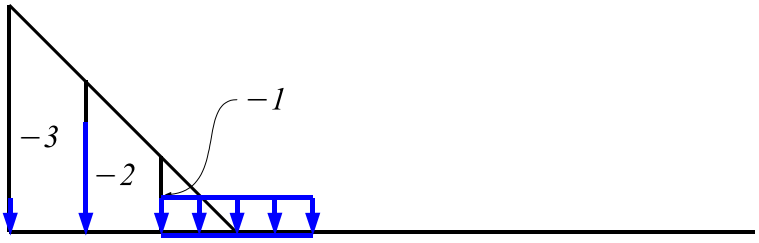
2.

$M_{max}=0\ [KNm] \quad M_{min}=-30\cdot 2-10\cdot 1=-70\ [KNm]$

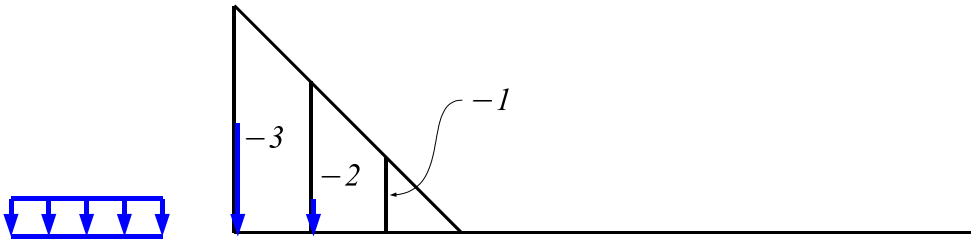
3.



$M_{max}=0\ [KNm] \quad M_{min}=-30\cdot 3-10\cdot 2\cdot 1=-110\ [KNm]$



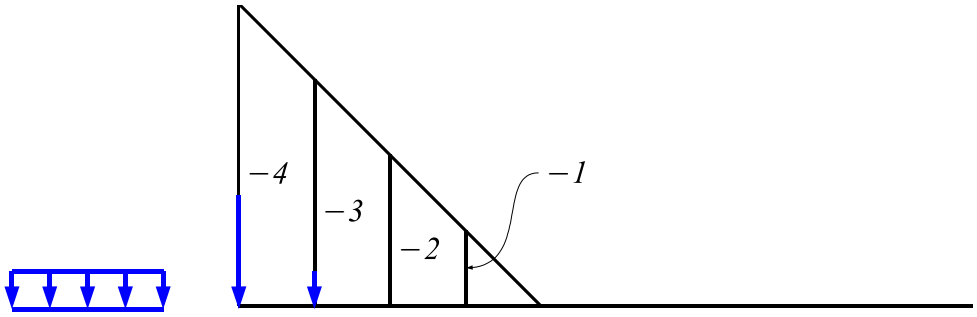
$M_{max}=0\ [KNm] \quad M_{min}=-10\cdot 3-30\cdot 2-10\cdot 1\cdot 0{,}5=-95\ [KNm]$



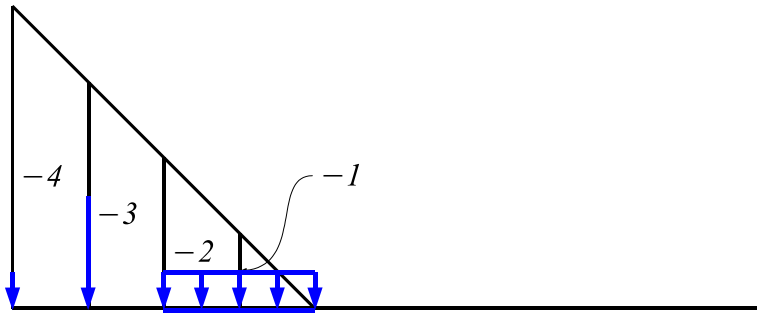
$M_{max}=0\ [KNm] \quad M_{min}=-30\cdot 3-10\cdot 2=-110\ [KNm]$

Czyli ostatecznie: $M_{min}=-110\ [KNm] \quad M_{max}=0\ [KNm]$

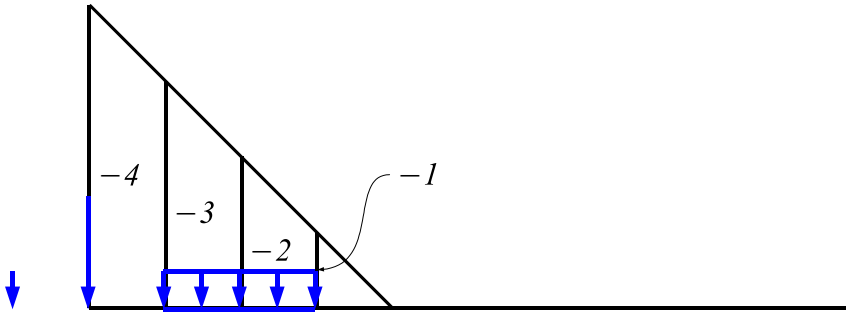
4.



$$M_{max}=0\ [KNm] \qquad M_{min}=-30\cdot 4-10\cdot 3=-150\ [KNm]$$



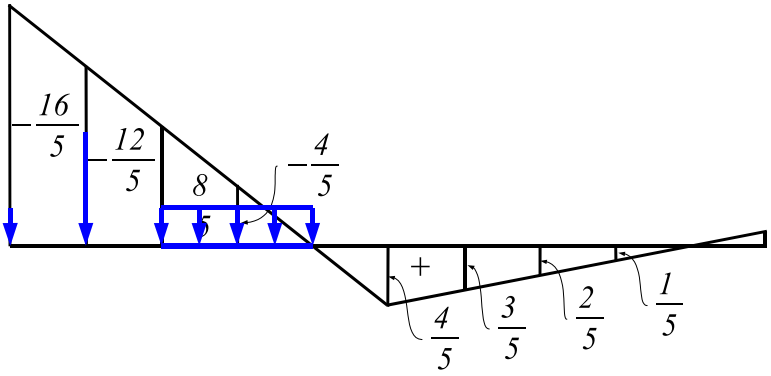
$$M_{max}=0\ [KNm] \qquad M_{min}=-10\cdot 4-30\cdot 3-10\cdot 2\cdot 1=-150\ [KNm]$$



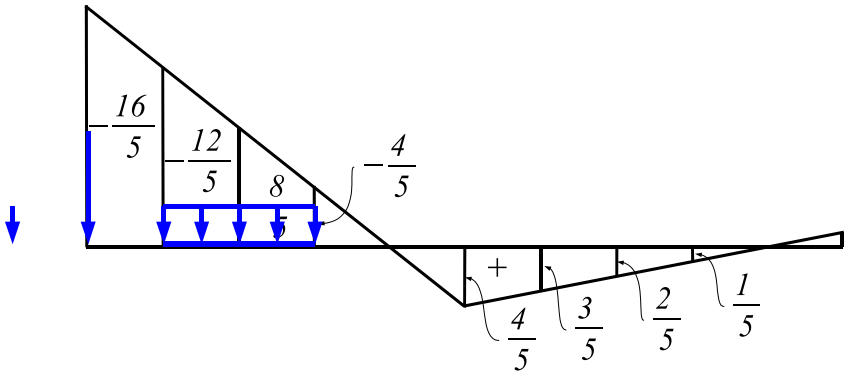
$$M_{max}=0\ [KNm] \qquad M_{min}=-30\cdot 4-10\cdot 2\cdot 2=-160\ [KNm]$$

Czyli ostatecznie: $M_{min}=-110\ [KNm] \qquad M_{max}=-160\ [KNm]$

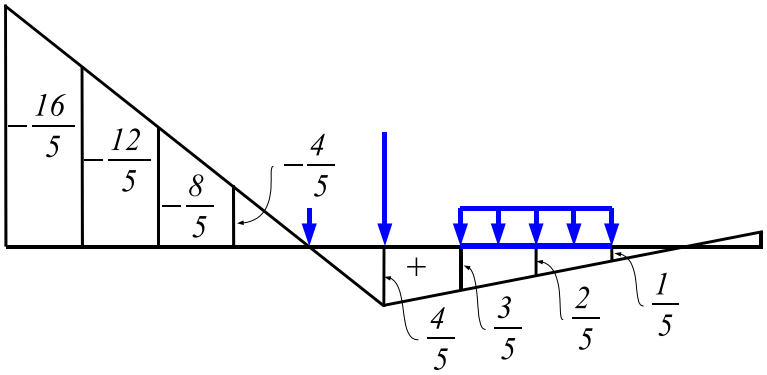
5.



$$M_{min} = -10 \cdot \frac{16}{5} - 30 \cdot \frac{12}{5} - 10 \cdot 2 \cdot \frac{4}{5} = -120 \left[KNm \right]$$



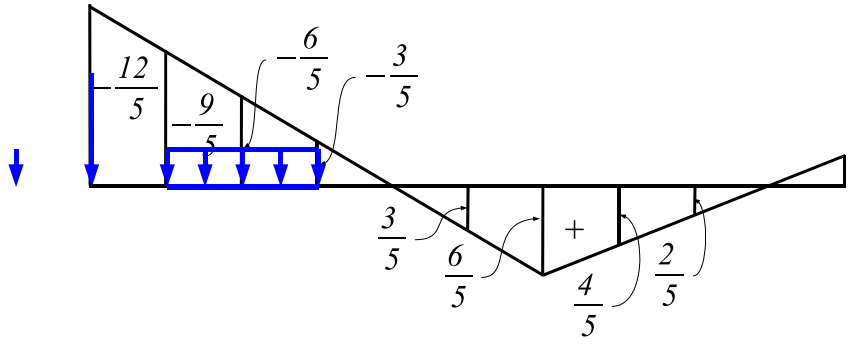
$$M_{min} = -30 \cdot \frac{16}{5} - 10 \cdot 2 \cdot \frac{8}{5} = -128 \left[KNm \right]$$



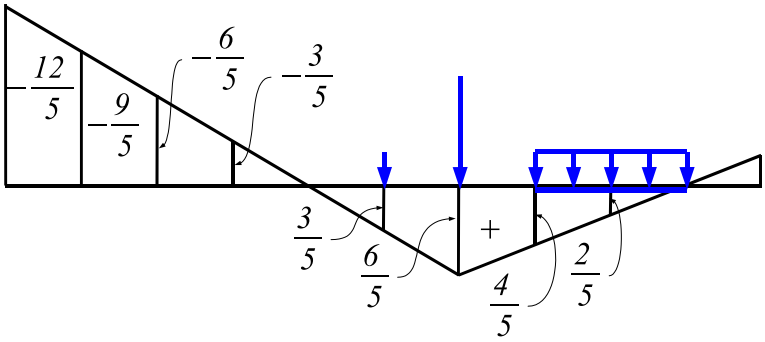
$$M_{max} = 30 \cdot \frac{4}{5} + 10 \cdot 2 \cdot \frac{2}{5} = 32 \left[KNm \right]$$

Czyli ostatecznie: $M_{min} = -128 \left[KNm \right]$ $M_{max} = 32 \left[KNm \right]$

6.



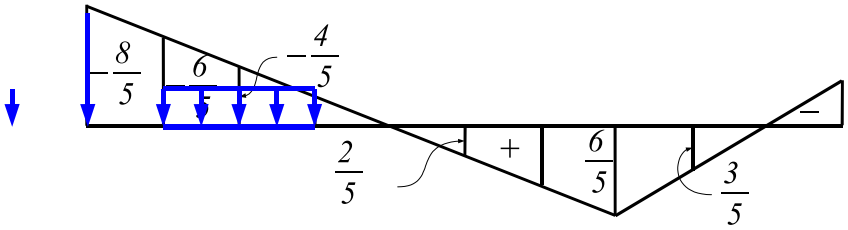
$$M_{min} = -30 \cdot \frac{12}{5} - 10 \cdot 2 \cdot \frac{6}{5} = -96 \left[KNm \right]$$



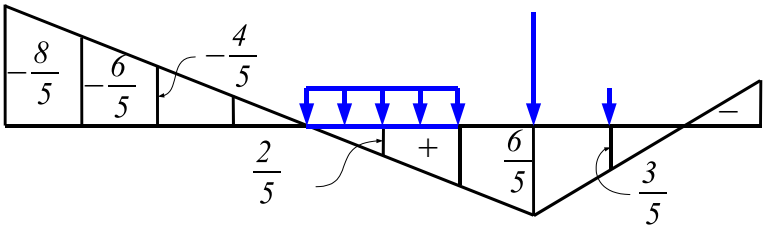
$$M_{max} = 10 \cdot \frac{3}{5} + 30 \cdot \frac{6}{5} + 10 \cdot 2 \cdot \frac{2}{5} = 50 \left[KNm \right]$$

Czyli ostatecznie: $M_{min} = -96 \left[KNm \right]$ $M_{max} = 50 \left[KNm \right]$

7.



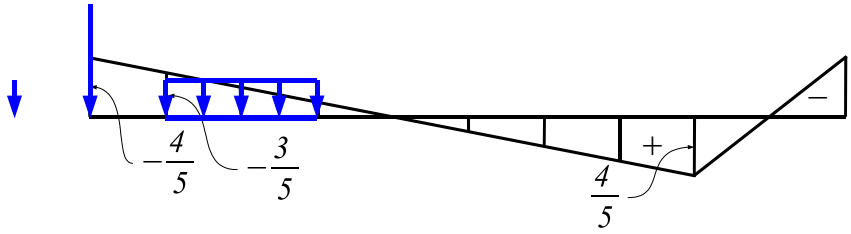
$$M_{min} = -30 \cdot \frac{8}{5} - 10 \cdot 2 \cdot \frac{4}{5} = -64 \left[KNm \right]$$



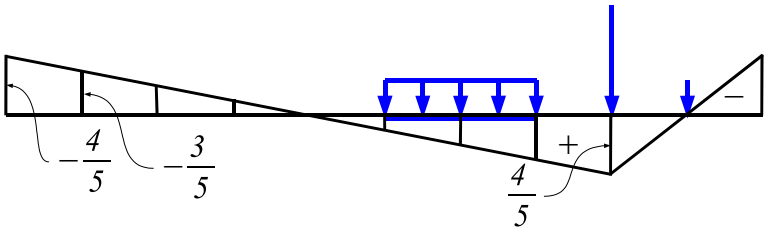
$$M_{max} = 10 \cdot \frac{3}{5} + 30 \cdot \frac{6}{5} + 10 \cdot 2 \cdot \frac{2}{5} = 50 \left[KNm \right]$$

Czyli ostatecznie: $M_{min} = -64 \left[KNm \right]$ $M_{max} = 50 \left[KNm \right]$

8.



$$M_{min} = -30 \cdot \frac{4}{5} - 10 \cdot 2 \cdot \frac{2}{5} = -32 \left[KNm \right]$$



$$M_{max} = 30 \cdot \frac{4}{5} + 10 \cdot 2 \cdot \frac{2}{5} = 32 \left[KNm \right]$$

9.

$$M_{max} = 0 \left[KNm \right] \quad M_{min} = -30 \cdot 1 = -30 \left[KNm \right]$$

10. $M_{min} = M_{max} = 0 \left[KNm \right]$

Obwiednia momentów: