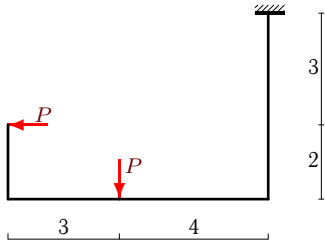


Определение перемещений в консольной раме

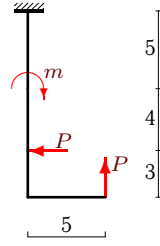
Найти линейные Δ_x , Δ_y и угловое перемещение Δ_φ свободного конца консольной рамы. Условно принять $EJ = 1$.

Задача 38.1.



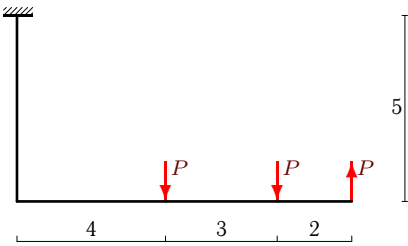
$P = 3 \text{ кН}$

Задача 38.2.



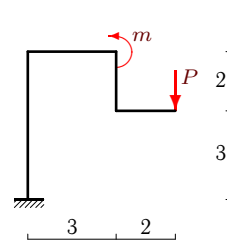
$P = 3 \text{ кН}, m = 30 \text{ кНм}$

Задача 38.3.



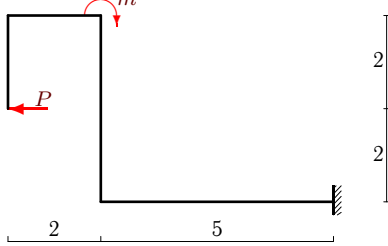
$P = 3 \text{ кН}$

Задача 38.4.



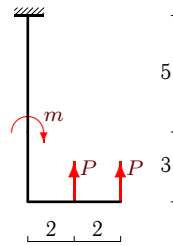
$P = 3 \text{ кН}, m = 30 \text{ кНм}$

Задача 38.5.



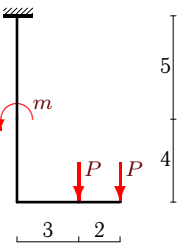
$P = 3 \text{ кН}, m = 12 \text{ кНм}$

Задача 38.6.



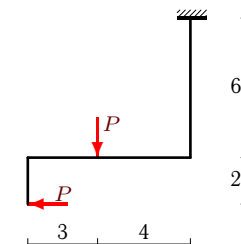
$P = 3 \text{ кН}, m = 24 \text{ кНм}$

Задача 38.7.



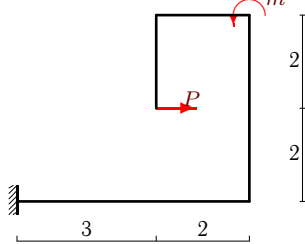
$P = 3 \text{ кН}, m = 30 \text{ кНм}$

Задача 38.8.



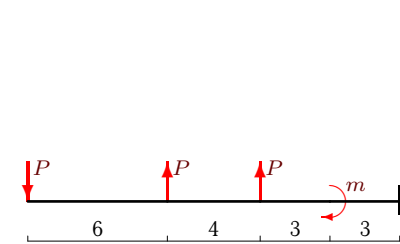
$P = 3 \text{ кН}$

Задача 38.9.



$P = 3 \text{ кН}, m = 12 \text{ кНм}$

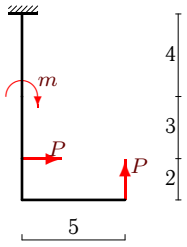
Задача 38.10.



$P = 3 \text{ кН}, m = 78 \text{ кНм}$

Задача 38.11.

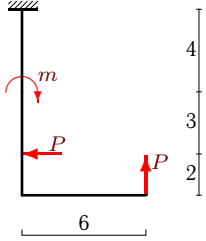
3



$P = 3 \text{ кН}, m = 30 \text{ кНм}$

Задача 38.13.

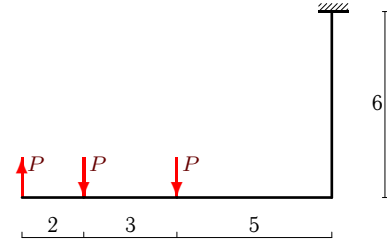
3



$P = 3 \text{ кН}, m = 36 \text{ кНм}$

Задача 38.15.

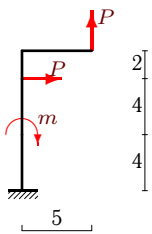
3



$P = 3 \text{ кН}$

Задача 38.17.

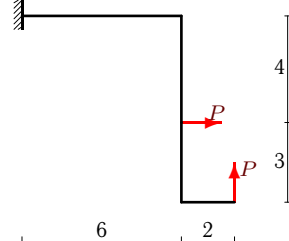
3



$P = 3 \text{ кН}, m = 30 \text{ кНм}$

Задача 38.19.

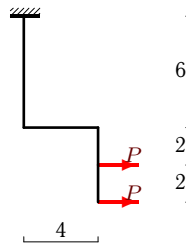
3



$P = 3 \text{ кН}$

Задача 38.12.

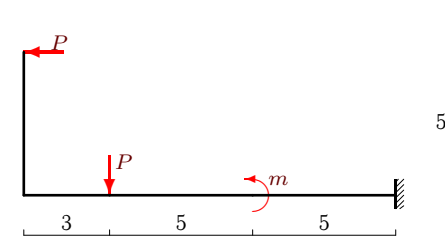
3



$P = 3 \text{ кН}$

Задача 38.14.

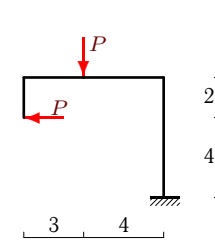
3



$P = 3 \text{ кН}, m = 30 \text{ кНм}$

Задача 38.16.

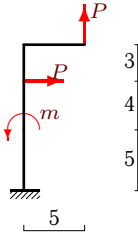
3



$P = 3 \text{ кН}$

Задача 38.18.

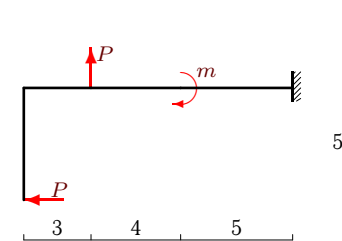
3



$P = 3 \text{ кН}, m = 30 \text{ кНм}$

Задача 38.20.

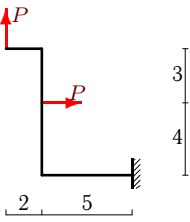
3



$P = 3 \text{ кН}, m = 30 \text{ кНм}$

Задача 38.21.

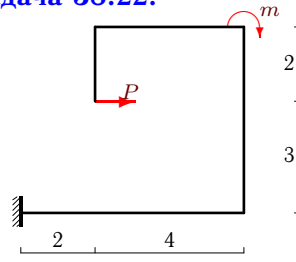
3



$P = 3 \text{ кН}$

Задача 38.22.

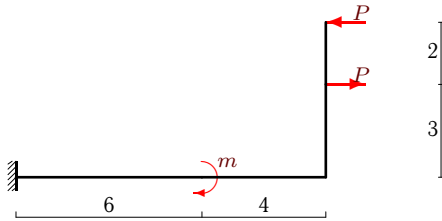
3



$P = 3 \text{ кН}, m = 18 \text{ кНм}$

Задача 38.23.

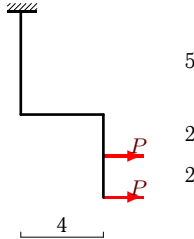
3



$P = 3 \text{ кН}, m = 30 \text{ кНм}$

Задача 38.24.

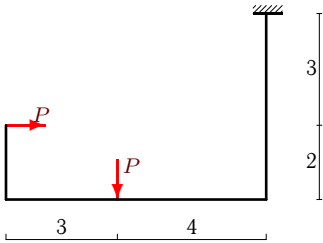
3



$P = 3 \text{ кН}$

Задача 38.25.

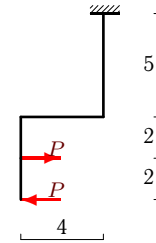
3



$P = 3 \text{ кН}$

Задача 38.26.

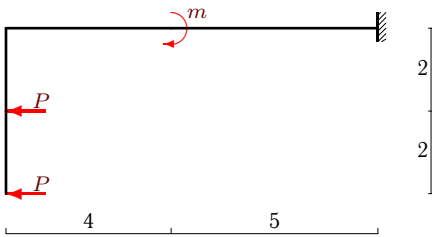
3



$P = 3 \text{ кН}$

Задача 38.27.

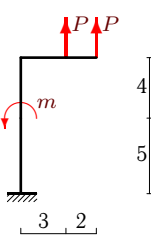
3



$P = 3 \text{ кН}, m = 24 \text{ кНм}$

Задача 38.28.

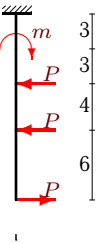
3



$P = 3 \text{ кН}, m = 30 \text{ кНм}$

Задача 38.29.

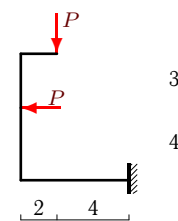
3



$P = 3 \text{ кН}, m = 78 \text{ кНм}$

Задача 38.30.

3



$P = 3 \text{ кН}$

Определение перемещений в консольной раме

| № | M_1 | M'_1 | M_2 | M'_2 | M_3 | M'_3 | M_4 | M'_4 | Δ_φ | Δ_x | Δ_y |
|----|-------|--------|-------|--------|-------|--------|-------|--------|------------------|------------|------------|
| 1 | 0 | 6 | 6 | 6 | 6 | 18 | 18 | 3 | 124.5 | -145 | -650.5 |
| 2 | 0 | 15 | 15 | 15 | 15 | 3 | -27 | -42 | -54 | -1438.5 | -332.5 |
| 3 | 0 | 6 | 6 | 6 | 6 | -6 | -6 | -6 | -6 | -75 | -215 |
| 4 | 0 | -6 | -6 | -6 | 24 | 15 | 15 | 15 | 115.5 | 67.5 | 541 |
| 5 | 0 | -6 | -6 | -6 | -18 | -6 | -6 | -6 | -96 | 12 | 243 |
| 6 | 0 | 6 | 6 | 18 | 18 | 18 | -6 | -6 | 54 | -84 | 180 |
| 7 | 0 | -6 | -6 | -24 | -24 | -24 | 6 | 6 | -117 | 3 | -509 |
| 8 | 0 | -6 | -6 | -6 | -6 | 6 | 6 | -12 | -42 | -188 | 137 |
| 9 | 0 | 6 | 6 | 6 | 18 | 6 | 6 | 6 | 96 | -12 | -93 |
| 10 | 0 | 18 | 18 | 18 | 18 | 9 | -69 | -78 | -54 | 0 | 1953 |
| 11 | 0 | 15 | 15 | 15 | 15 | 24 | -6 | 6 | 126 | 257.5 | 567.5 |
| 12 | 0 | 6 | 6 | 18 | 18 | 18 | 18 | 54 | 318 | 1992 | 1008 |
| 13 | 0 | 18 | 18 | 18 | 18 | 9 | -27 | -39 | -1.5 | -769 | -117 |
| 14 | 0 | 15 | 15 | 15 | 15 | 30 | 0 | 15 | 232.5 | -1100 | -1142.5 |
| 15 | 0 | -6 | -6 | -6 | -6 | 9 | 9 | 9 | 37.5 | 162 | -556.5 |
| 16 | 0 | -6 | -6 | -6 | -6 | 6 | 6 | 24 | 66 | -188 | -619 |
| 17 | 0 | 15 | 15 | 15 | 15 | 3 | -27 | -39 | -28.5 | 914 | -205 |
| 18 | 0 | 15 | 15 | 15 | 15 | 3 | -27 | -42 | -54 | 1438.5 | -332.5 |
| 19 | 0 | 6 | 6 | 6 | 6 | 18 | 18 | 36 | 234 | 1417 | 1004 |
| 20 | 0 | -15 | -15 | -15 | -15 | -27 | 3 | -12 | -189 | -882.5 | 748.5 |
| 21 | 0 | -6 | -6 | -6 | -6 | -18 | -18 | -33 | -199.5 | 1175.5 | 745 |
| 22 | 0 | 6 | 6 | 6 | 24 | 9 | 9 | 9 | 166.5 | -116 | -432 |
| 23 | 0 | 6 | 6 | 6 | 6 | 6 | -24 | -24 | -96 | 529 | -960 |
| 24 | 0 | 6 | 6 | 18 | 18 | 18 | 18 | 48 | 267 | 1507 | 804 |
| 25 | 0 | -6 | -6 | -6 | -6 | 6 | 6 | 21 | 43.5 | 109 | -461.5 |
| 26 | 0 | -6 | -6 | -6 | -6 | -6 | -6 | -6 | -72 | -335 | 168 |
| 27 | 0 | -6 | -6 | -18 | -18 | -18 | 6 | 6 | -72 | -252 | -51 |
| 28 | 0 | 6 | 6 | 24 | 24 | 24 | -6 | -6 | 117 | 3 | 509 |
| 29 | 0 | 18 | 18 | 18 | 18 | 9 | -69 | -78 | -54 | -1953 | 0 |
| 30 | 0 | -6 | -6 | -6 | -6 | 6 | 6 | 24 | 66 | -619 | -188 |

| № | Δ_{x1} | Δ_{x2} | Δ_{x3} | Δ_{x4} | Δ_{y1} | Δ_{y2} | Δ_{y3} | Δ_{y4} | $\Delta_{\varphi1}$ | $\Delta_{\varphi2}$ | $\Delta_{\varphi3}$ | $\Delta_{\varphi4}$ |
|----|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------------|---------------------|---------------------|---------------------|
| 1 | -5.0 | -96.0 | -36.0 | -8.0 | -367.5 | -256.0 | -27.0 | 0.0 | 52.5 | 48.0 | 18.0 | 6.0 |
| 2 | -1670.0 | 164.0 | 67.5 | 0.0 | -862.5 | 180.0 | 225.0 | 125.0 | -172.5 | 36.0 | 45.0 | 37.5 |
| 3 | -75.0 | 0.0 | 0.0 | 0.0 | -270.0 | -16.0 | 63.0 | 8.0 | -30.0 | 0.0 | 18.0 | 6.0 |
| 4 | -37.5 | 117.0 | -12.0 | 0.0 | 375.0 | 198.0 | -24.0 | -8.0 | 75.0 | 58.5 | -12.0 | -6.0 |
| 5 | 60.0 | -16.0 | -24.0 | -8.0 | 135.0 | 96.0 | 12.0 | 0.0 | -30.0 | -48.0 | -12.0 | -6.0 |
| 6 | -165.0 | 81.0 | 0.0 | 0.0 | -120.0 | 216.0 | 76.0 | 8.0 | -30.0 | 54.0 | 24.0 | 6.0 |
| 7 | 195.0 | -192.0 | 0.0 | 0.0 | 150.0 | -480.0 | -171.0 | -8.0 | 30.0 | -96.0 | -45.0 | -6.0 |
| 8 | -144.0 | 0.0 | -36.0 | -8.0 | 126.0 | -16.0 | 27.0 | 0.0 | -18.0 | 0.0 | -18.0 | -6.0 |
| 9 | -60.0 | 16.0 | 24.0 | 8.0 | 15.0 | -96.0 | -12.0 | 0.0 | 30.0 | 48.0 | 12.0 | 6.0 |
| 10 | 0.0 | 0.0 | 0.0 | 0.0 | 3204.0 | -459.0 | -576.0 | -216.0 | -220.5 | 40.5 | 72.0 | 54.0 |
| 11 | 16.0 | 211.5 | 30.0 | 0.0 | 0.0 | 292.5 | 150.0 | 125.0 | 0.0 | 58.5 | 30.0 | 37.5 |
| 12 | 1620.0 | 288.0 | 76.0 | 8.0 | 864.0 | 144.0 | 0.0 | 0.0 | 216.0 | 72.0 | 24.0 | 6.0 |
| 13 | -940.0 | 135.0 | 36.0 | 0.0 | -792.0 | 243.0 | 216.0 | 216.0 | -132.0 | 40.5 | 36.0 | 54.0 |
| 14 | -187.5 | -562.5 | -225.0 | -125.0 | -425.0 | -650.0 | -67.5 | 0.0 | 37.5 | 112.5 | 45.0 | 37.5 |
| 15 | 162.0 | 0.0 | 0.0 | 0.0 | -540.0 | -87.5 | 63.0 | 8.0 | 54.0 | 7.5 | -18.0 | -6.0 |
| 16 | -144.0 | 0.0 | -36.0 | -8.0 | -630.0 | -16.0 | 27.0 | 0.0 | 90.0 | 0.0 | -18.0 | -6.0 |
| 17 | 1072.0 | -128.0 | -30.0 | 0.0 | -660.0 | 180.0 | 150.0 | 125.0 | -132.0 | 36.0 | 30.0 | 37.5 |
| 18 | 1670.0 | -164.0 | -67.5 | 0.0 | -862.5 | 180.0 | 225.0 | 125.0 | -172.5 | 36.0 | 45.0 | 37.5 |
| 19 | 1134.0 | 256.0 | 27.0 | 0.0 | 864.0 | 96.0 | 36.0 | 8.0 | 162.0 | 48.0 | 18.0 | 6.0 |
| 20 | -112.5 | -420.0 | -225.0 | -125.0 | 245.0 | 436.0 | 67.5 | 0.0 | -22.5 | -84.0 | -45.0 | -37.5 |
| 21 | 892.5 | 256.0 | 27.0 | 0.0 | 605.0 | 96.0 | 36.0 | 8.0 | -127.5 | -48.0 | -18.0 | -6.0 |
| 22 | -162.0 | -10.0 | 48.0 | 8.0 | -54.0 | -330.0 | -48.0 | 0.0 | 54.0 | 82.5 | 24.0 | 6.0 |
| 23 | 720.0 | -120.0 | -63.0 | -8.0 | -1008.0 | 48.0 | 0.0 | 0.0 | -144.0 | 24.0 | 18.0 | 6.0 |
| 24 | 1135.0 | 288.0 | 76.0 | 8.0 | 660.0 | 144.0 | 0.0 | 0.0 | 165.0 | 72.0 | 24.0 | 6.0 |
| 25 | 65.0 | 0.0 | 36.0 | 8.0 | -472.5 | -16.0 | 27.0 | 0.0 | 67.5 | 0.0 | -18.0 | -6.0 |
| 26 | -195.0 | -96.0 | -36.0 | -8.0 | 120.0 | 48.0 | 0.0 | 0.0 | -30.0 | -24.0 | -12.0 | -6.0 |
| 27 | 120.0 | -288.0 | -76.0 | -8.0 | -195.0 | 144.0 | 0.0 | 0.0 | 30.0 | -72.0 | -24.0 | -6.0 |
| 28 | 195.0 | -192.0 | 0.0 | 0.0 | -150.0 | 480.0 | 171.0 | 8.0 | -30.0 | 96.0 | 45.0 | 6.0 |
| 29 | -3204.0 | 459.0 | 576.0 | 216.0 | 0.0 | 0.0 | 0.0 | 0.0 | -220.5 | 40.5 | 72.0 | 54.0 |
| 30 | -630.0 | -16.0 | 27.0 | 0.0 | -144.0 | 0.0 | -36.0 | -8.0 | 90.0 | 0.0 | -18.0 | -6.0 |