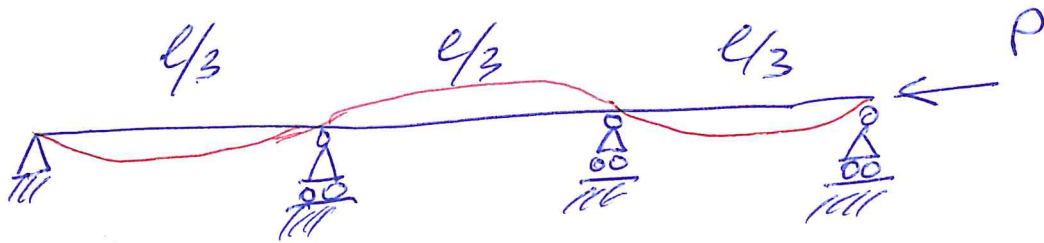
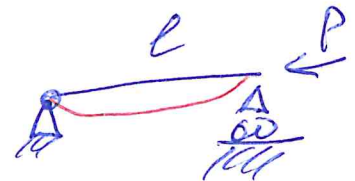
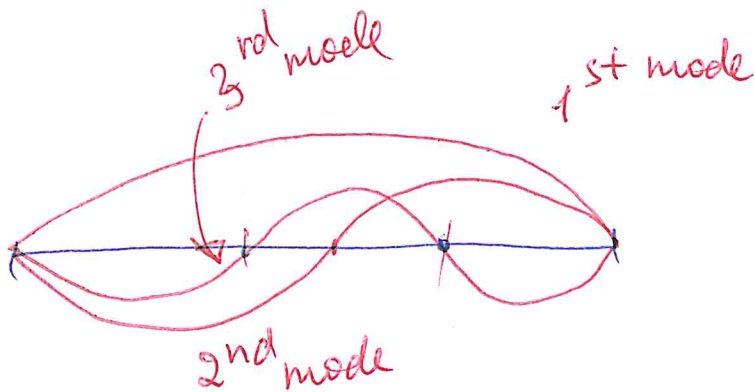


①



$P_c - ?$



$$P_c = \frac{\pi^2 EI}{l^2}$$

1st mode $P_1 = \frac{\pi^2 EI}{l^2}$

2nd mode $P_2 = \frac{4\pi^2 EI}{l^2}$

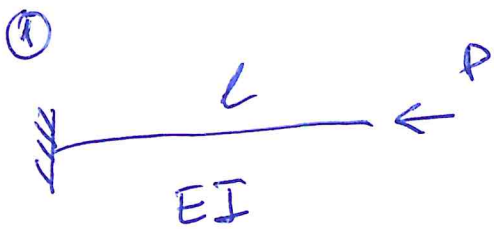
3rd mode $P_3 = \frac{9\pi^2 EI}{l^2}$

$$\sin \beta l = 0$$

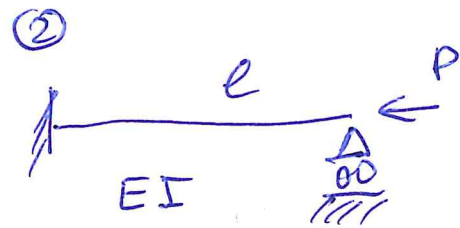
$$\beta l = \pi n, \quad n = 1, 2, \dots$$

$$\beta = \sqrt{\frac{P}{EI}}$$

$$P_c = P_3$$



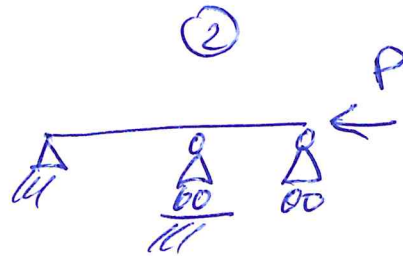
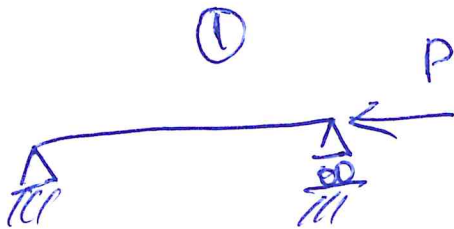
P_1



P_2

$$P_1 \leq P_2$$

more kinematical constraints result in
the increase the critical load



$$\underline{P_1 < P_2}$$