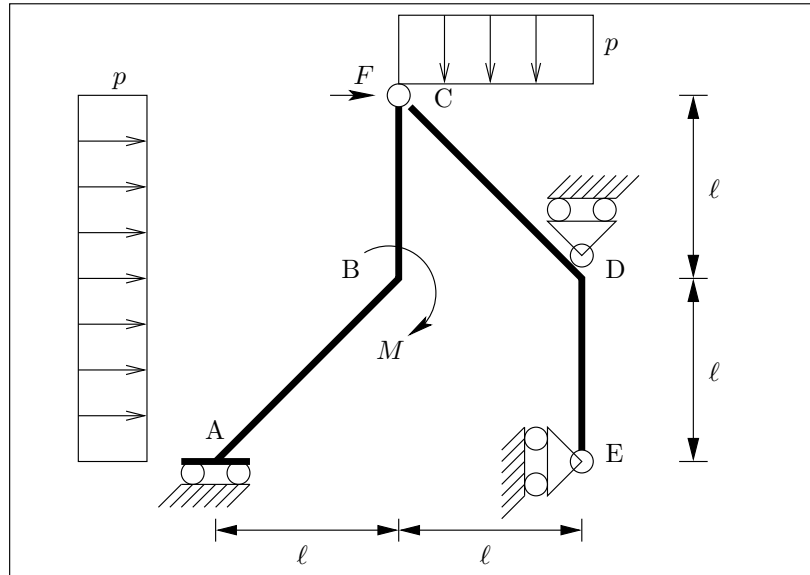


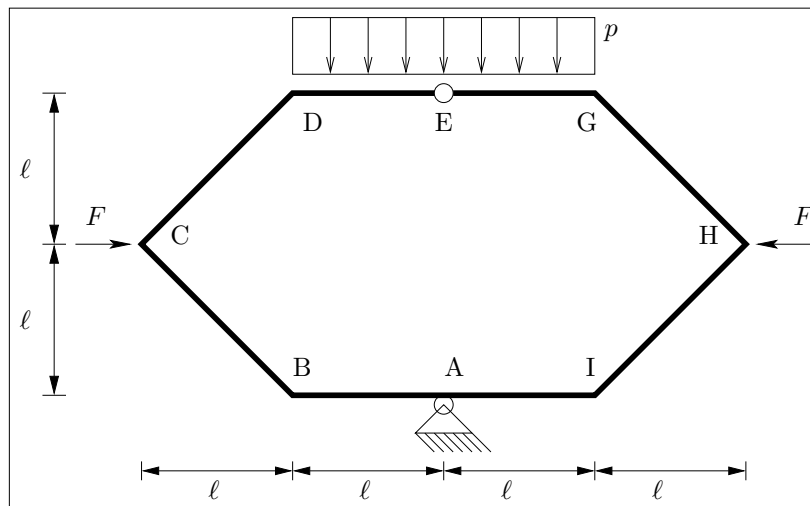
Statica - Ingegneria Civile e Ambientale - Prof. Daniele Zulli

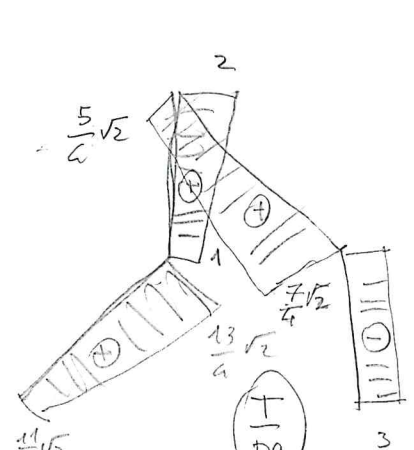
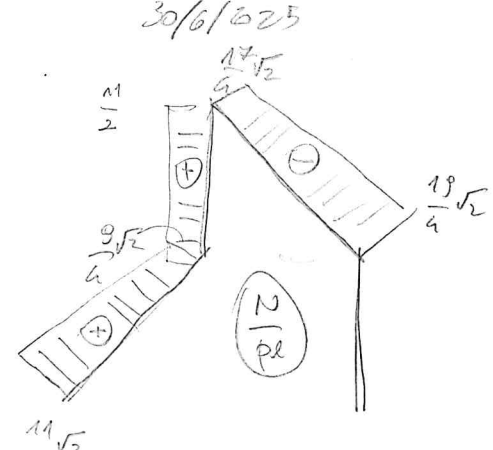
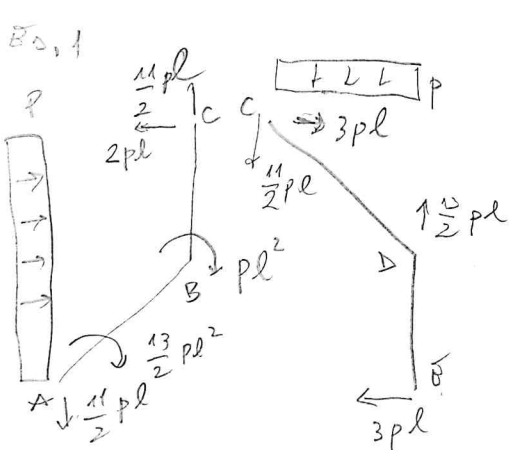
APPELLO DEL 30/6/2025 - DURATA 3 ORE

Esercizio 1: Scrivere e diagrammare le leggi di variazione delle caratteristiche di sollecitazione per la struttura in figura, nel caso in cui sia $F = p\ell$ e $M = p\ell^2$. Calcolare la rotazione della sezione in B, noto EI e per $EA \rightarrow +\infty$.



Esercizio 2: Diagrammare le caratteristiche di sollecitazione per la struttura in figura nel caso in cui sia $F = p\ell$ ed $EA \rightarrow +\infty$.

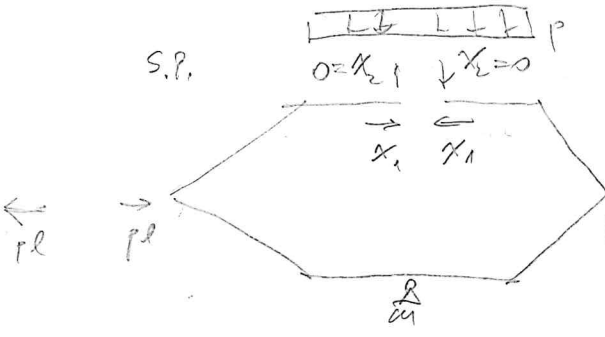
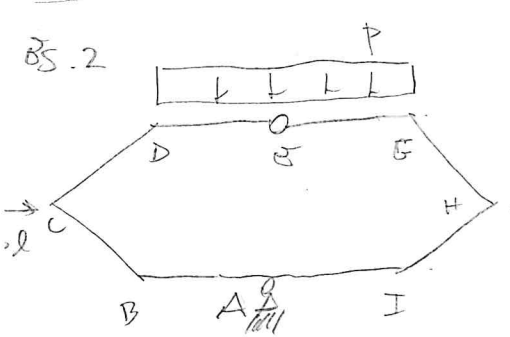




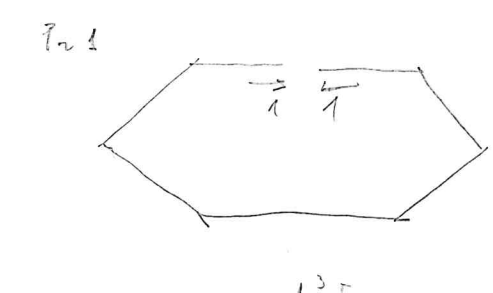
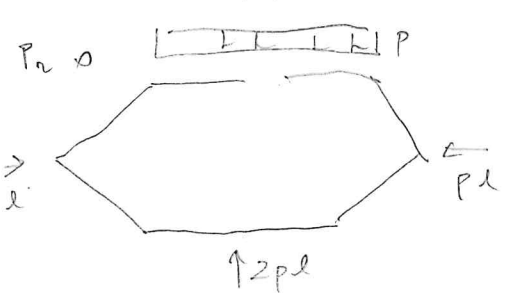
TRAVO	LUNGO	N	T	M
AB	$l\sqrt{2}$	$\frac{11}{4}\sqrt{2}pl - \frac{px^2}{2}$	$\frac{11}{4}\sqrt{2}pl + \frac{px}{2}$	$\frac{13}{2}pl^2 - \frac{11}{4}\sqrt{2}plx - \frac{px^2}{4}$
BC	l	$\frac{11}{2}pl$	$pl + px$	$\frac{3}{2}pl^2 - plx - \frac{px^2}{2}$
CD	$l\sqrt{2}$	$-\frac{11}{4}\sqrt{2}pl + \frac{px}{2}$	$\frac{5}{4}\sqrt{2}pl + \frac{px}{2}$	$-\frac{5}{4}\sqrt{2}plx - \frac{px^2}{4}$
DE	l	0	$-3pl$	$-3pl^2 + 3plx$

$M_{AB}^x(x) = 1$, otherwise $M^x(x) = 0$

$$P_B = \frac{1}{EI} \int_0^{l\sqrt{2}} \left(\frac{13}{2}pl^2 - \frac{11}{4}\sqrt{2}plx - \frac{px^2}{4} \right) dx = \frac{43\sqrt{2}}{12} \frac{pl^3}{EI}$$



Struttura labile
per vincoli esterni
ma con forze esterne
che compiono lavoro
virtuale nullo
sul modo di labilità
che è rotazione attorno
ad A. Due rotte
invertite per vincoli
interni ma per simmetria
di geometria e carichi $X_2 = 0$



TRAVO	LUNGO	M_p	M_1
BD	l	$\frac{px^2}{2}$	0
DC	$l\sqrt{2}$	$\frac{pl^2}{2} + pl\sqrt{2}x$	$\frac{\sqrt{2}}{2}x$
CB	$l\sqrt{2}$	$\frac{3}{2}pl^2$	$l + \frac{\sqrt{2}}{2}x$
BA	l	$\frac{3}{2}pl^2 - plx$	$2l$

$$\gamma_{11} = 2 \frac{l^3}{EI} \left[4 + \frac{8\sqrt{2}}{3} \right], \quad \gamma_{10} = 2 \frac{pl^4}{EI} \left[2 + \frac{17}{6}\sqrt{2} \right], \quad \gamma_{11} = 0$$

$$\gamma_{11} X_1 + \gamma_{10} + \gamma_{11} = 0 \Rightarrow X_1 = \left(4 - \frac{27}{8}\sqrt{2} \right) pl \approx -0.77 pl = -0.2 pl$$

con $\alpha = 0.77$

