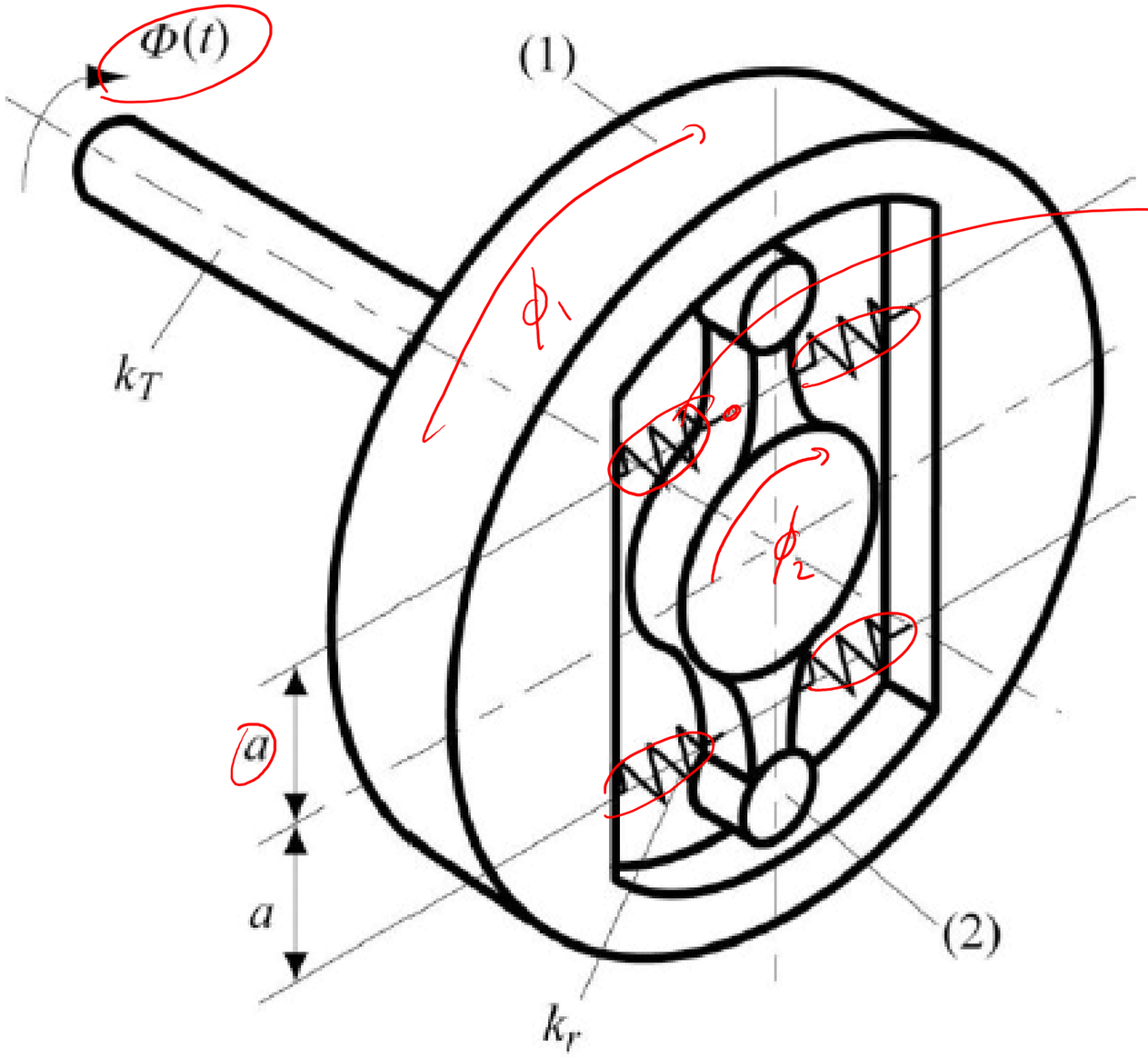
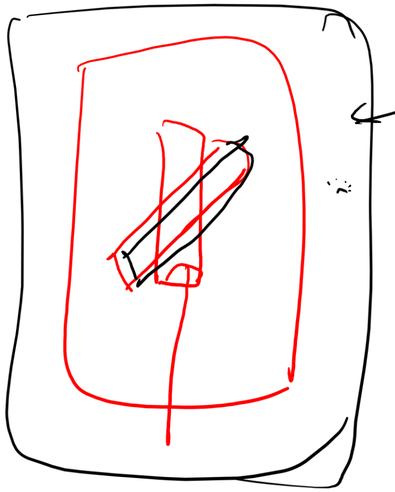
Semaine 9
Doutes

ME-332 – Mécanique Vibratoire

École
polytechnique
fédérale
de Lausanne

Exo 7.3





$F = k \cdot \Delta x$

$F = k \cdot (\phi_1 - \phi_2) \cdot a$

$|\Pi| = |k a^2 (\phi_1 - \phi_2)|$

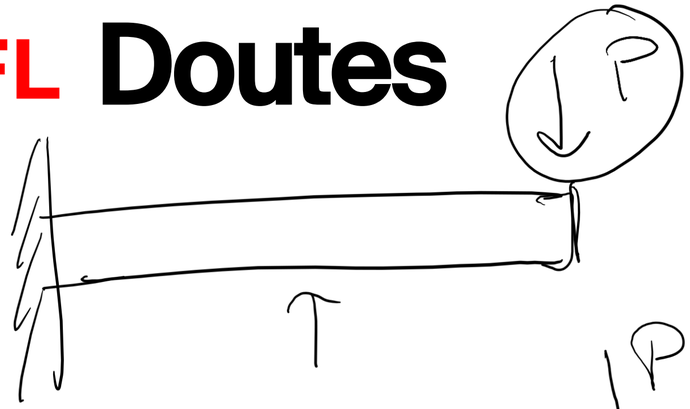
$\Pi_2 = 4 k a^2 (\phi_1 - \phi_2)$

$\Pi_1 = -4 k a^2 (\phi_1 - \phi_2) = 4 k a^2 (\phi_2 - \phi_1)$

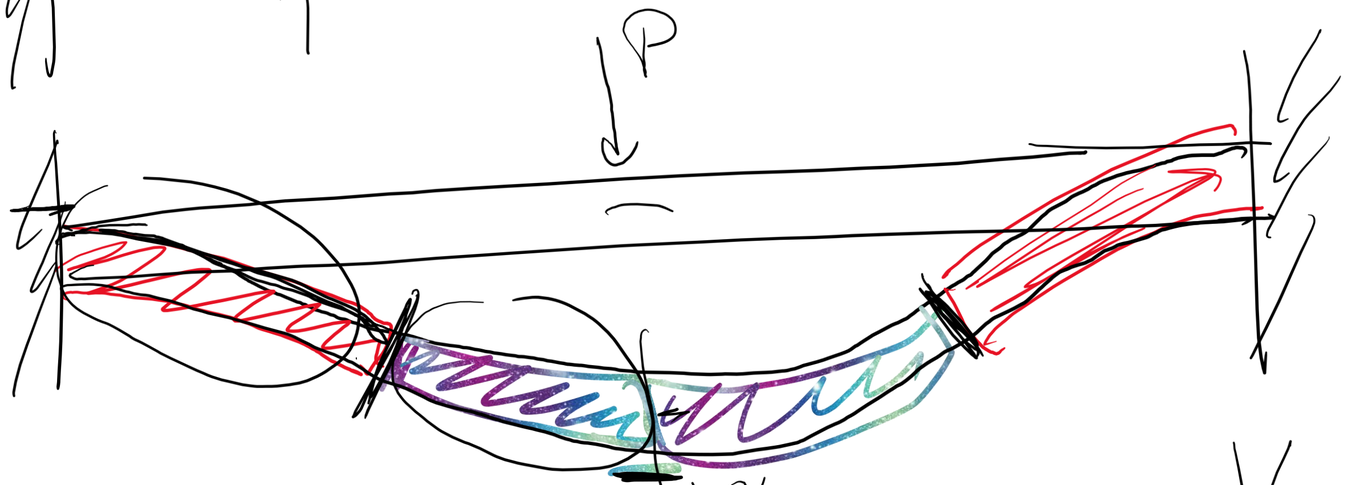
$\sum \bar{\Pi} = I \ddot{\theta}_P$

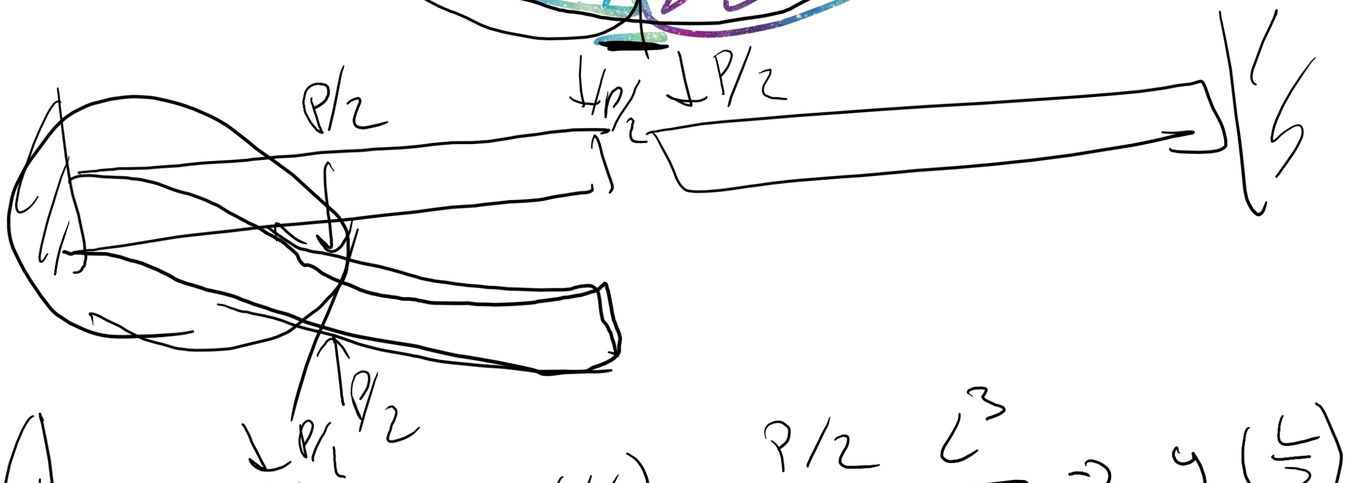
$I \ddot{\theta} - \sum \bar{\Pi} = 0$

Doutes



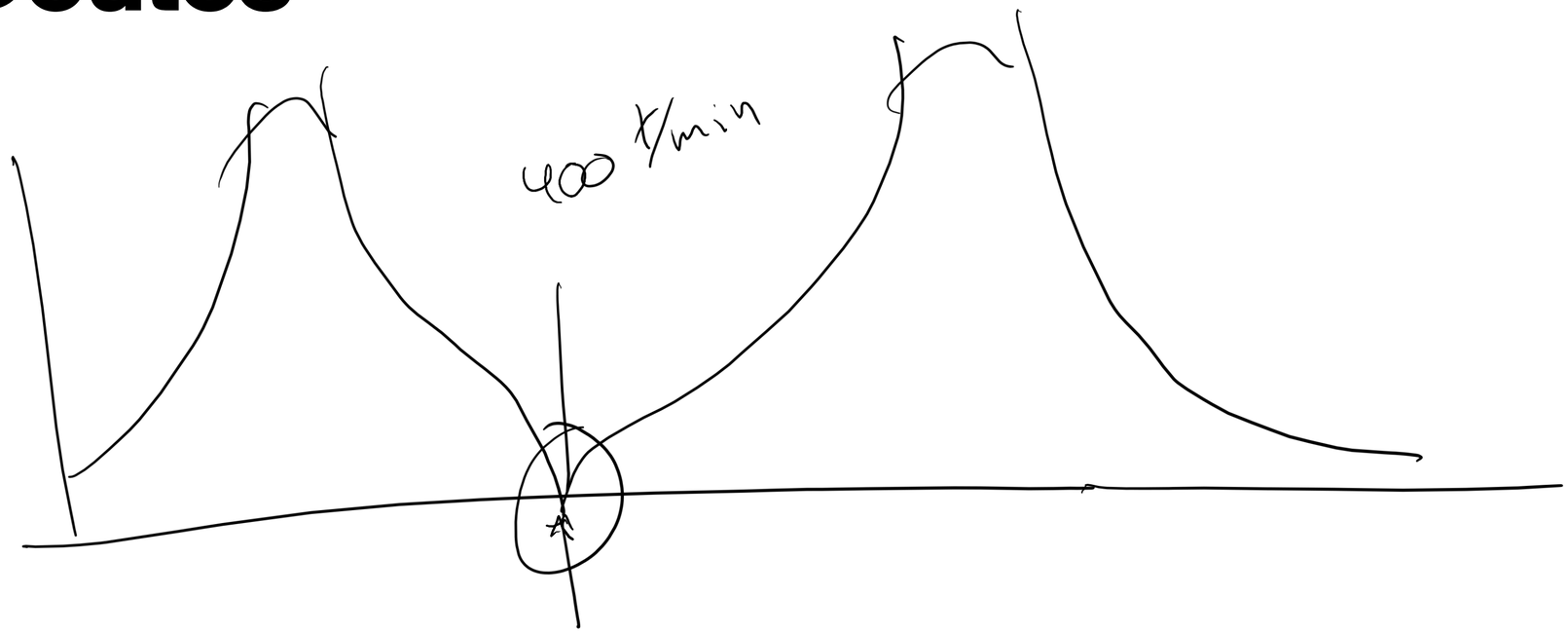
$$y(L) = \frac{P}{3EI} L^3 \rightarrow k = \frac{3EI}{L^3}$$

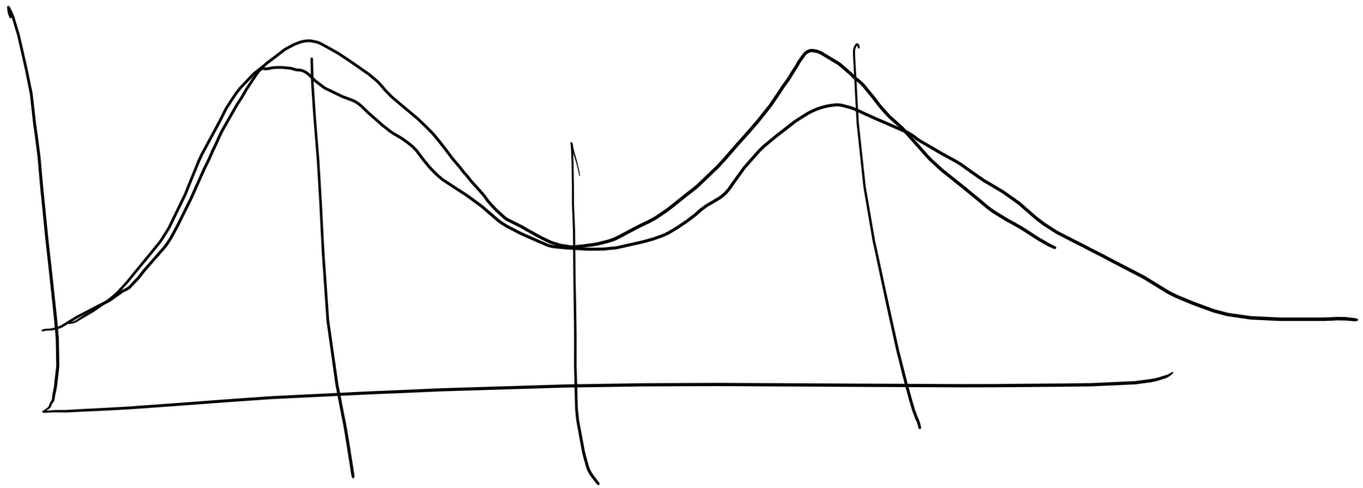




$$\Rightarrow y(L/4) = \frac{P/2}{3EI} \frac{L^3}{64} \Rightarrow y\left(\frac{L}{2}\right) = \frac{P}{3EI} \frac{L^3}{64}$$

Doutes





Semaine 9
QCMs

ME-332 – Mécanique Vibratoire

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Plan du cours

Week	Jours	Partie du cours	Exercices	Homework
1	09.09//11.09	Intro et oscillateur 1D libre conservatif	Série 1	Leçon 1.1&1.2
2	18.09	Oscillateur 1D libre dissipatif	Série 2	Leçon 2.1&2.2
3	23.09//25.09	Régime permanent harmonique (complexe)	Série 3	Leçon 3.1&3.2
4	30.09//02.10	Régime permanent périodique (série de Fourier)	Série 4	Leçon 4.1&4.2
5	07.10//09.10	Régime forcé général (transf. Laplace ou Fourier)	Série 5	Leçon 5.1&5.2
6	14.10//16.10	Systèmes à 2 DDL conservatifs	Série 6	Leçon 6.1&6.2
BREAK!!!				
7	28.10//30.10	Récapitulatif // séance de QCMs	MIDTERM	
8	04.11//06.11	Systèmes à 2DDL dissipatifs, osc. de Frahm	Série 7	Leçon 7.1&7.2
9	11.11//13.11	Systèmes à n DDL, conservatif	Série 8a	Leçon 8.1&8.2
10	18.11//20.11	Systèmes à n DDL, conservatif	Série 8b	
11	25.11//27.11	Systèmes à n DDL, dissipatif	Série 9	Leçon 9.1&9.2
12	02.12//04.12	Systèmes à n DDL, forcé	Série 10	Leçon 10.1&10.2
13	09.12//11.12	Systèmes continus: barres & poutres	Série 11	Leçon 11.1&11.2
14	16.12//18.12	Récapitulatif // séance de QCMs		

Before we start… let's connect!

- Smartphones
  - iPhone
  - Android

  } Download and install the app "*PointSolutions*"

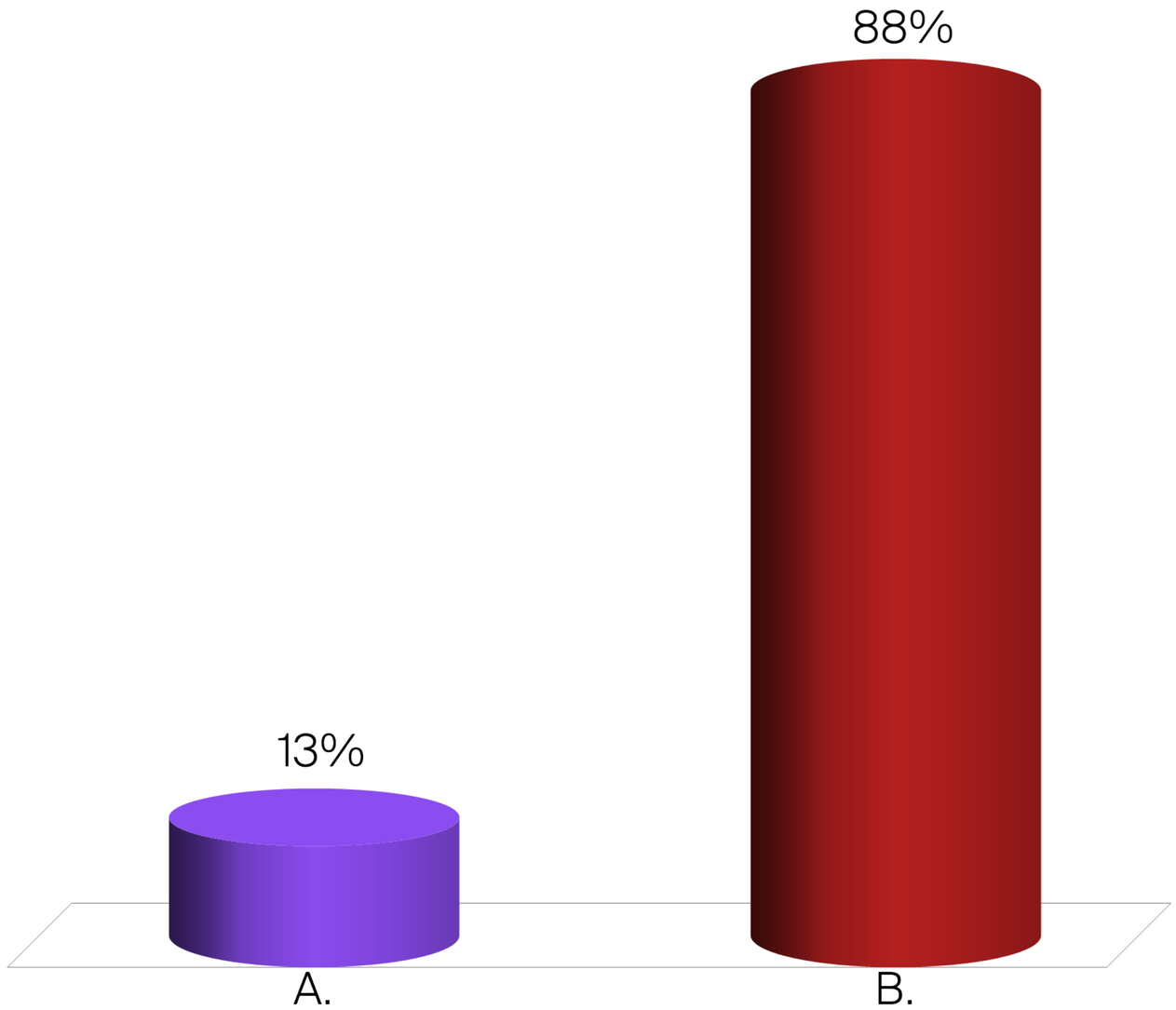
pointsolutions
powered by echo360

- Computers (or Windows Phones)
  - Go to www.responseware.eu

- Choose **EUROPE Server** (if asked)
- Join session – **ME332**
- When asked – **do not input your name. Enter as anonymous.**

Midterm ou QCMs?

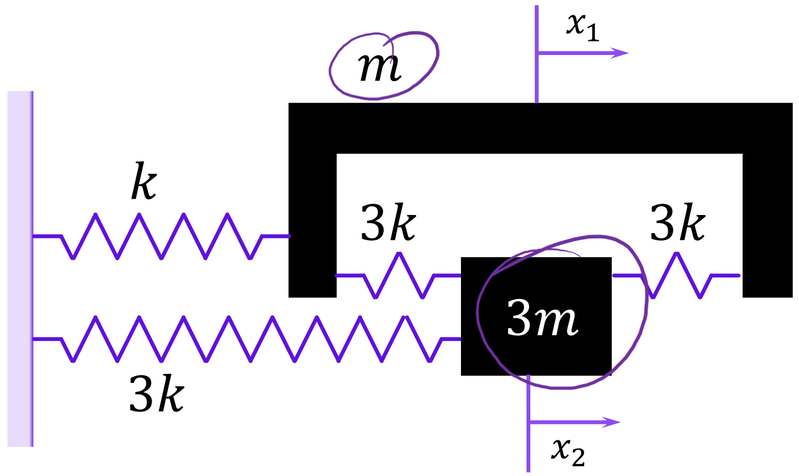
A. Midterm
B. QCMs

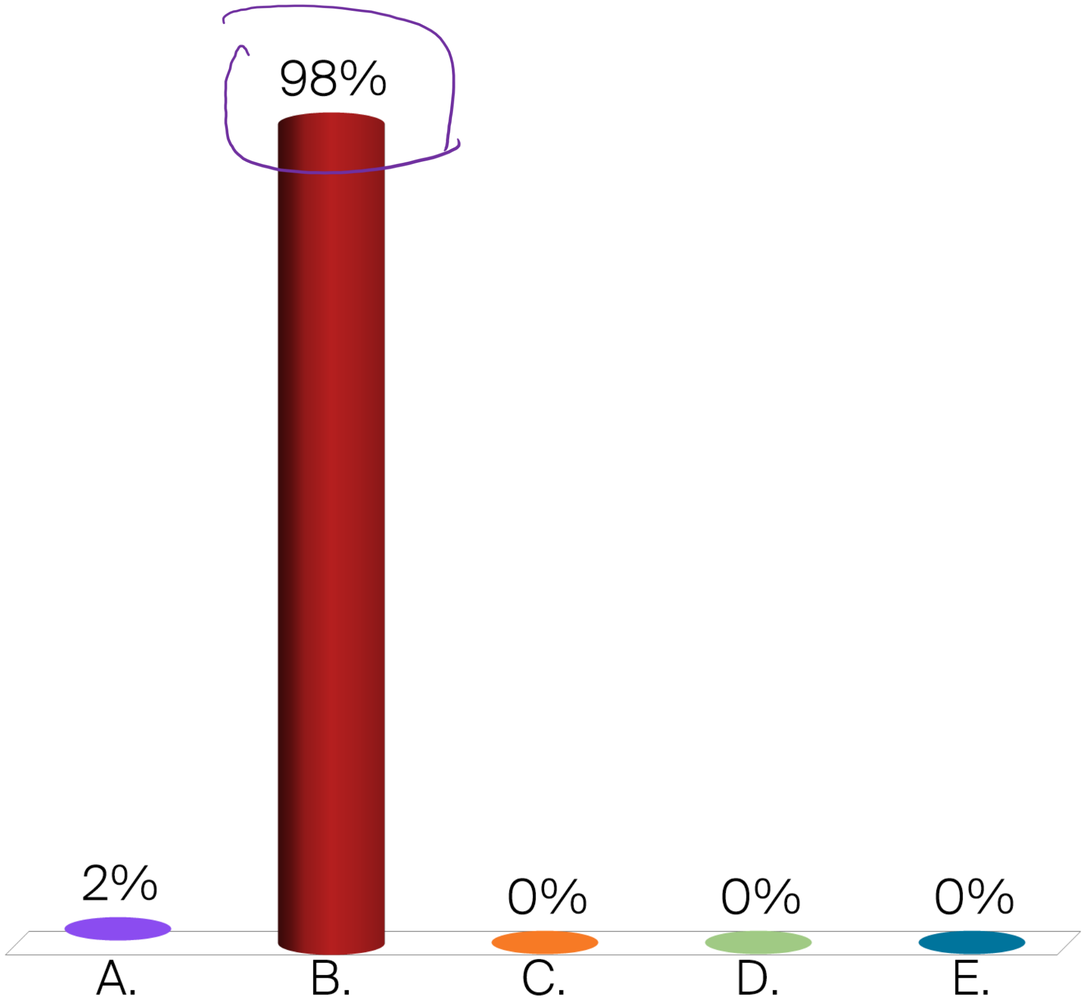


ME332

Combien DdL?

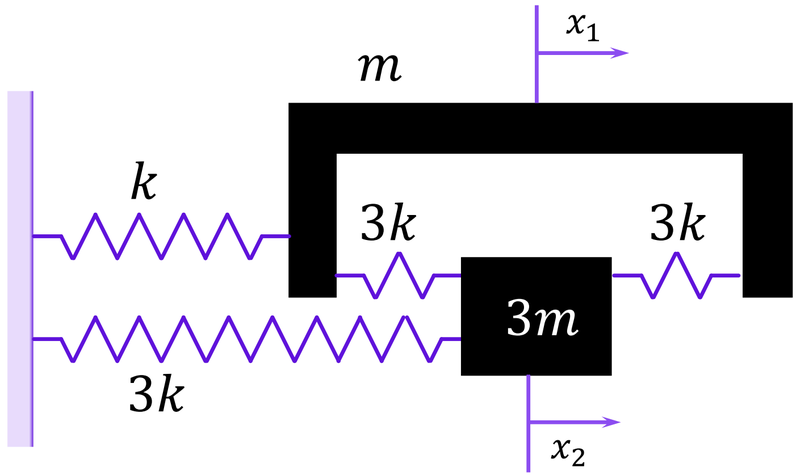
A. 1
B. 2
C. 3
D. 4
E. Je ne sais pas

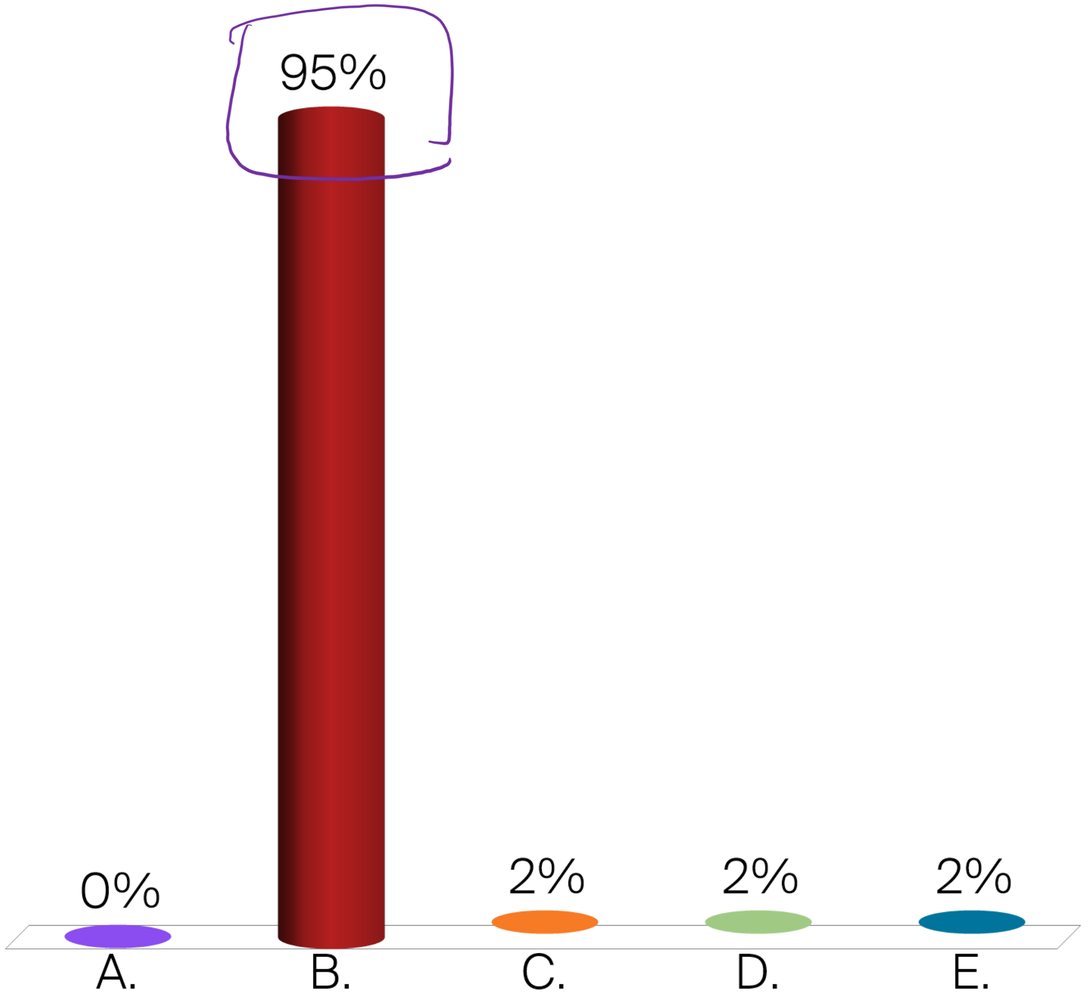




Combien Modes Normaux peut-on trouver?

A. 1
B. 2
C. 3
D. 4
E. Je ne sais pas





Si $\vec{\beta}_I = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$ et $\vec{\beta}_{II} = \begin{pmatrix} 1 \\ -1/3 \end{pmatrix}$, dans quelles C.I. le système bougera à ω_I?

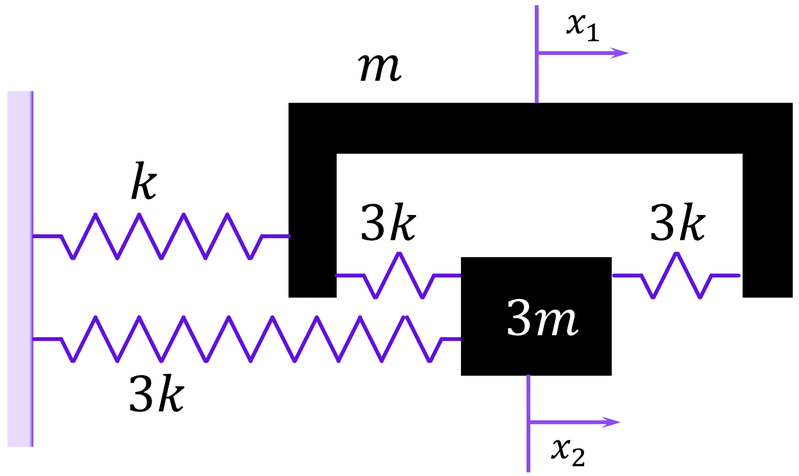
A. $x_1(0) = 1, x_2(0) = 1, \dot{x}_1(0) = \dot{x}_2(0) = 0$

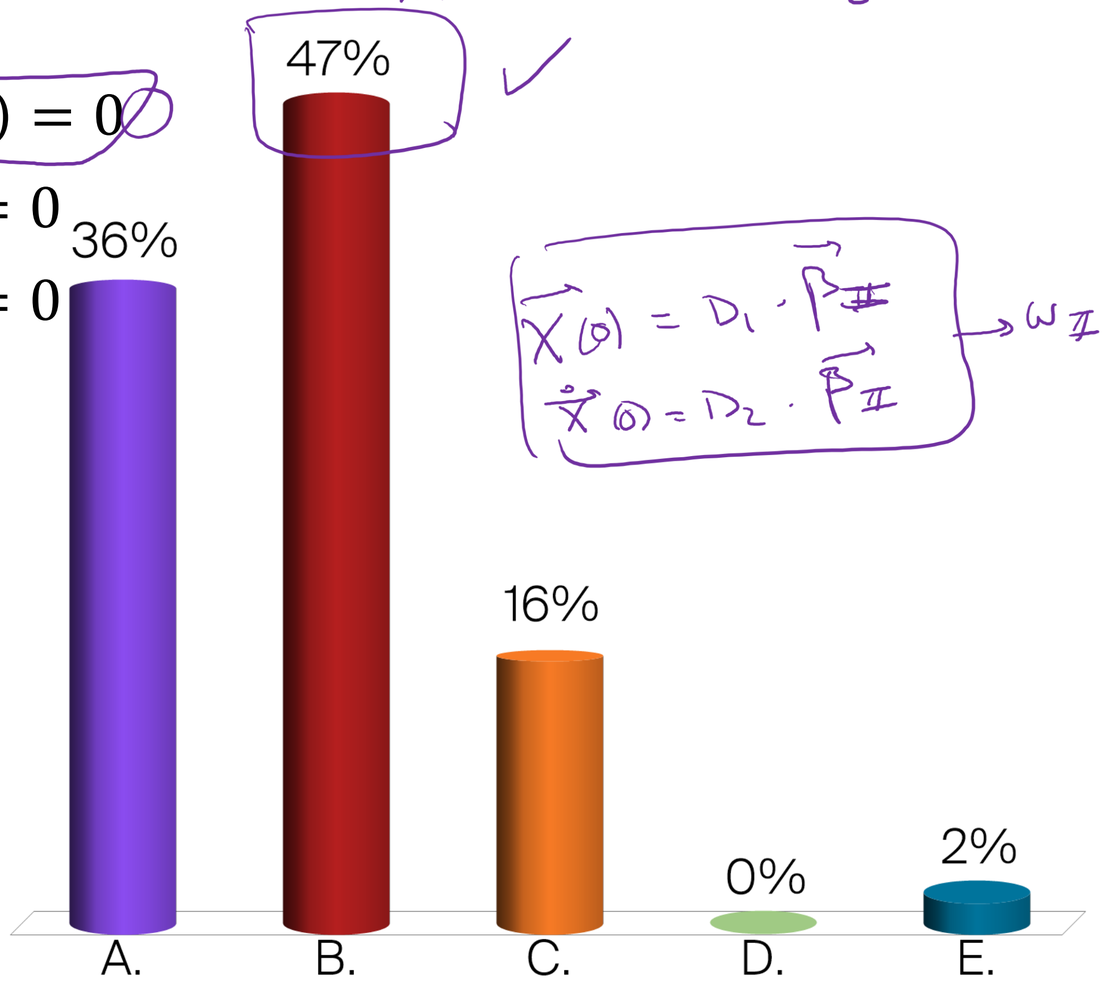
B. $x_1(0) = 1\,\mathrm{m}, x_2(0) = 1\,\mathrm{m}, \dot{x}_1(0) = \dot{x}_2(0) = 0$

C. $x_1(0) = 1\,\mathrm{m}, x_2(0) = 0, \dot{x}_1(0) = \dot{x}_2(0) = 0$

D. $x_1(0) = 0, x_2(0) = 1\,\mathrm{m}, \dot{x}_1(0) = \dot{x}_2(0) = 0$

E. Je ne sais pas





Décompose C.I. en base modale:

$$\dot{x}_1(0) = \dot{x}_2(0) = 0, x_1(0) = 0, x_2(0) = 1\,\text{m}?$$

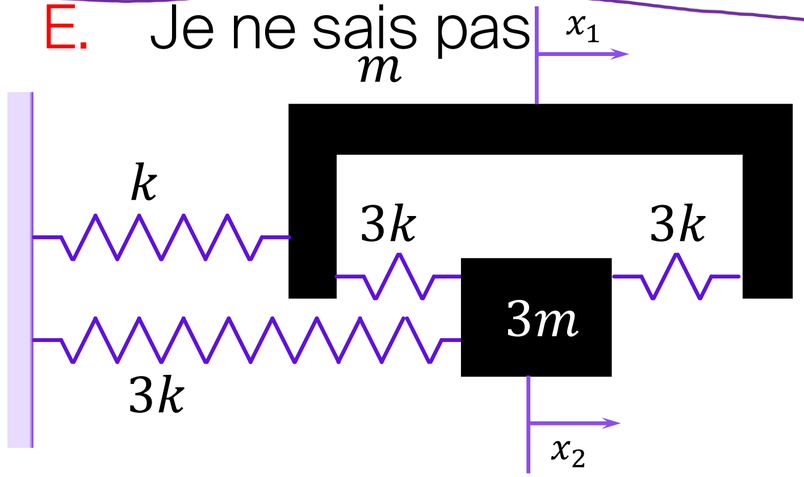
A. $\vec{x}(t=0) = \begin{pmatrix}0\\1\end{pmatrix} = \vec{\beta}_I + 3\vec{\beta}_{II}$

B. $\vec{x}(t=0) = \begin{pmatrix}0\\1\end{pmatrix}\text{m} = 1\text{m}\,\vec{\beta}_I + 3\text{m}\,\vec{\beta}_{II}$

C. $\vec{x}(t=0) = \begin{pmatrix}0\\1\end{pmatrix}\text{m} = \frac{2}{3}\text{m}\,\vec{\beta}_I - \text{m}\,\vec{\beta}_{II}$

D. $\vec{x}(t=0) = \begin{pmatrix}0\\1\end{pmatrix}\text{m} = \frac{3}{4}\text{m}\,\vec{\beta}_I - \frac{3}{4}\text{m}\,\vec{\beta}_{II}$

E. Je ne sais pas



$\vec{\beta}_I = \begin{pmatrix}1\\1\end{pmatrix}$ $\vec{\beta}_{II} = \begin{pmatrix}1\\-1/3\end{pmatrix}$

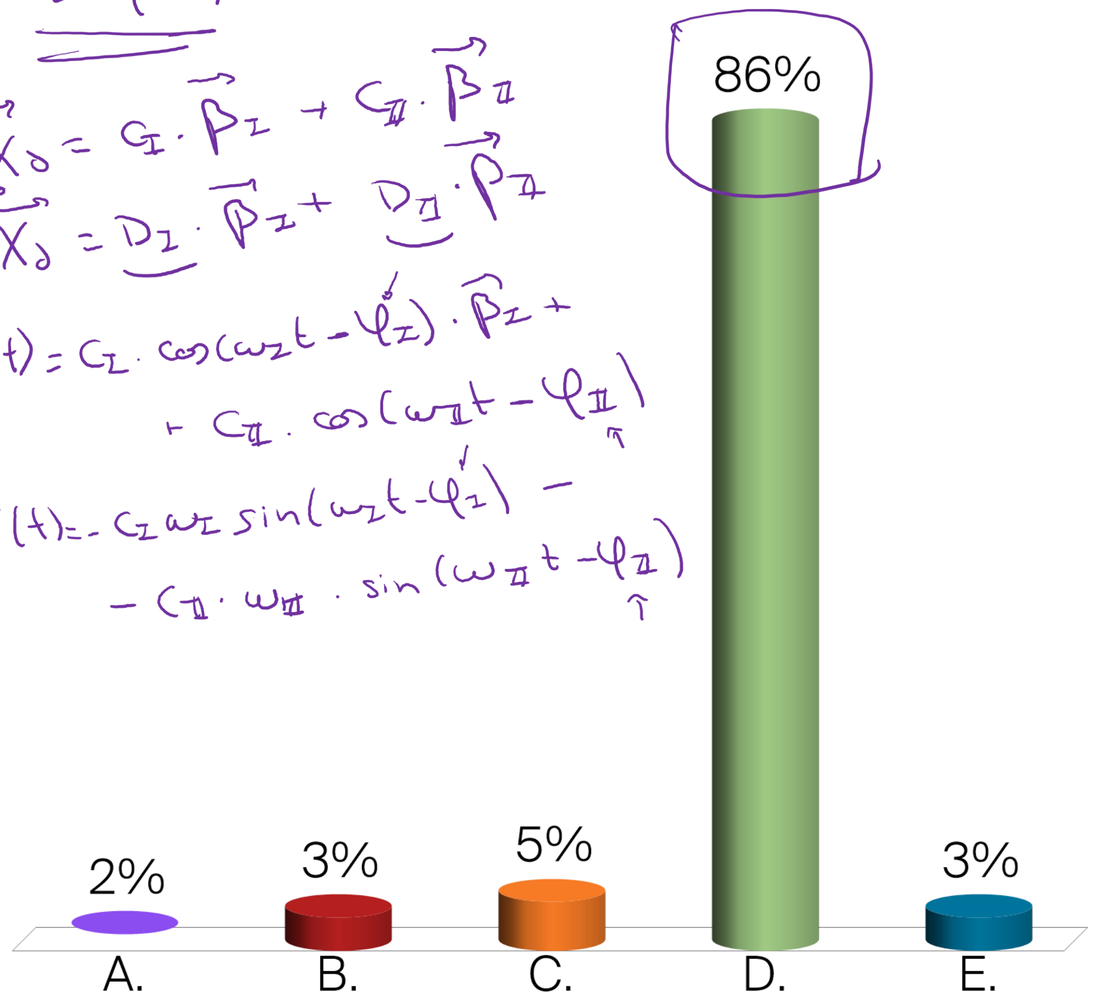
$\vec{x}_0 = \begin{pmatrix}0\\0\end{pmatrix}$ $\vec{\dot{x}}_0 = \begin{pmatrix}0\\1\end{pmatrix}$ m

$\vec{x}_0 = C_I \cdot \vec{\beta}_I + C_{II} \cdot \vec{\beta}_{II}$

$\vec{\dot{x}}_0 = D_I \cdot \vec{\beta}_I + D_{II} \cdot \vec{\beta}_{II}$

$\vec{x}(t) = C_I \cdot \cos(\omega_I t - \varphi_I) \cdot \vec{\beta}_I + C_{II} \cdot \cos(\omega_{II} t - \varphi_{II})$

$\vec{\dot{x}}(t) = -C_I \omega_I \sin(\omega_I t - \varphi_I) - C_{II} \cdot \omega_{II} \cdot \sin(\omega_{II} t - \varphi_{II})$



Evolution temporelle avec $\dot{x}_1(0) = \dot{x}_2(0) = 0$, $x_1(0) = 0, x_2(0) = 1\,\mathrm{m}$?

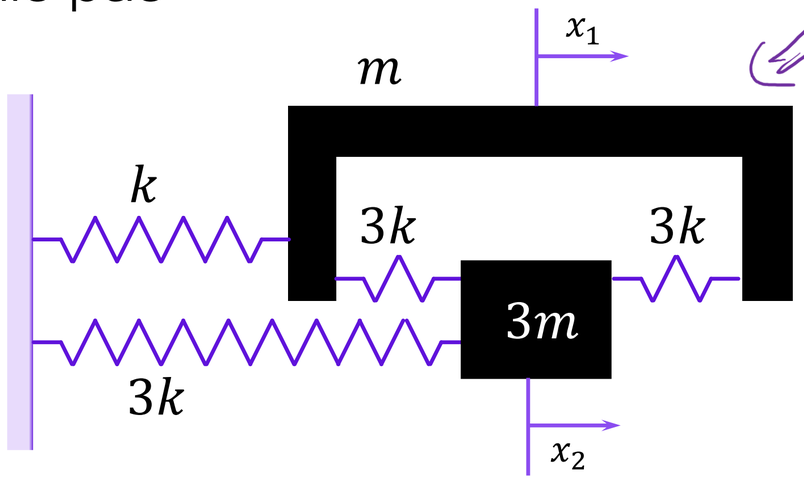
A. $\vec{x}(t) = \begin{pmatrix} 0 \\ 1\mathrm{m}\cos(\omega_0 t) \end{pmatrix}$

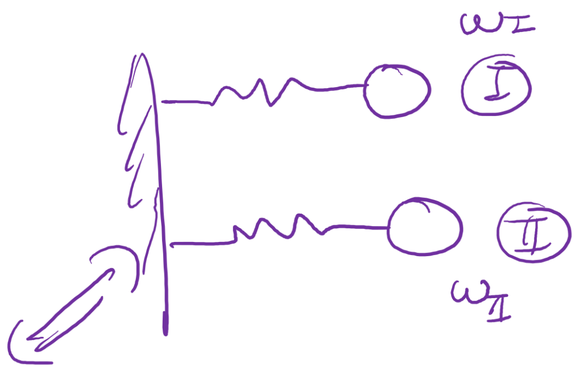
B. $\vec{x}(t) = \begin{pmatrix} 0 \\ 1\mathrm{m}\cos(\omega_{II} t) \end{pmatrix}$

C. $\vec{x}(t) = \frac{3}{4}\mathrm{m}\begin{pmatrix} \cos(\omega_I t) - \cos(\omega_{II} t) \\ \cos(\omega_I t) + \frac{1}{3}\cos(\omega_{II} t) \end{pmatrix}$

D. $\vec{x}(t) = \frac{3}{4}\mathrm{m}\begin{pmatrix} \cos(\omega_I t) - \cos(\omega_{II} t) \\ \cos(\omega_I t) - \cos(\omega_{II} t) \end{pmatrix}$

E. Je ne sais pas





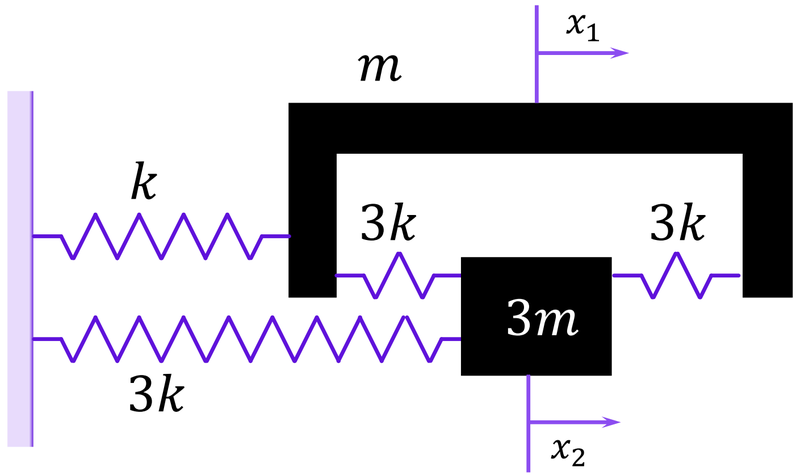
Energie Cinétique?

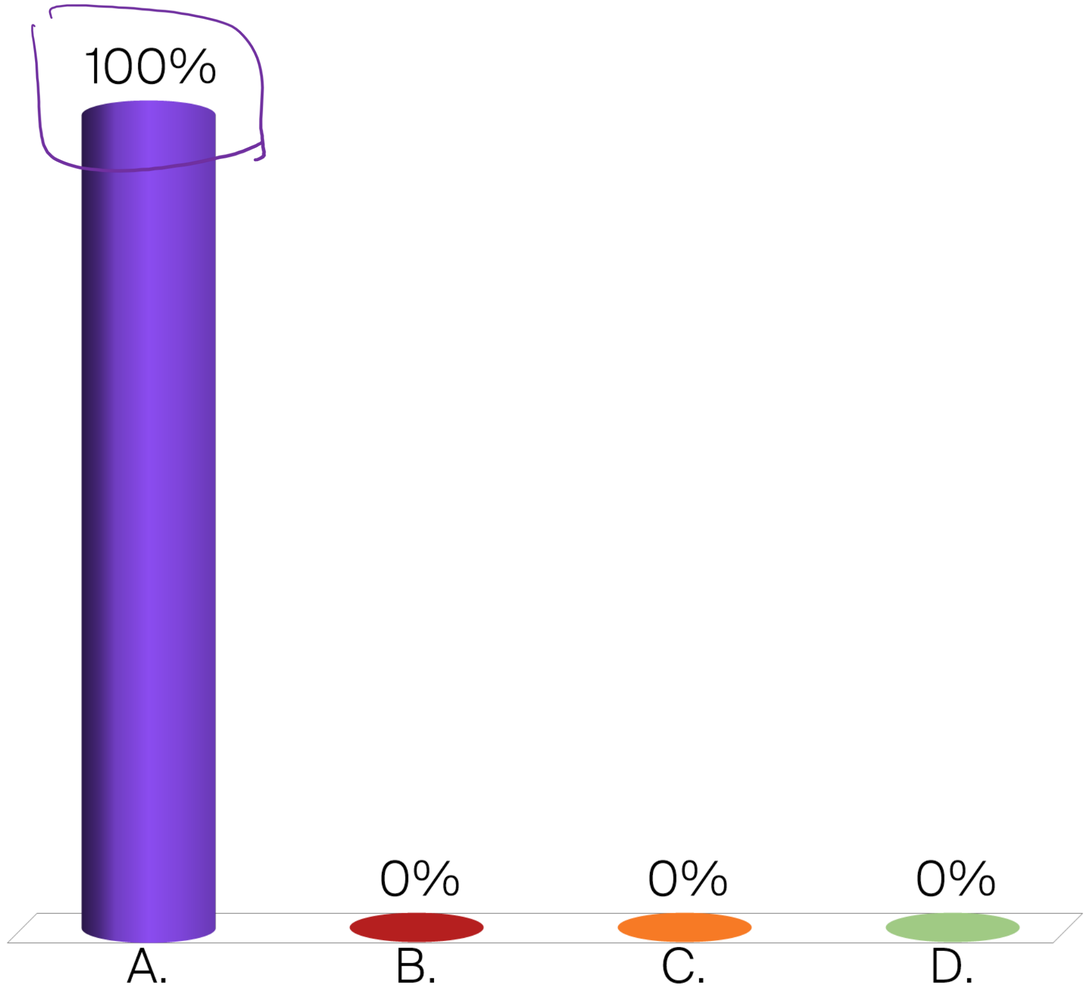
A. $T = \frac{1}{2}m\dot{x}_1^2 + \frac{1}{2}3m\dot{x}_2^2$

B. $T = \frac{1}{2}3m\dot{x}_1^2 + \frac{1}{2}m\dot{x}_2^2$

C. $T = \frac{1}{2}m\dot{x}_1^2 + \frac{1}{2}m\dot{x}_2^2$

D. Je ne sais pas





Energie Potentielle?

A. $V = \frac{1}{2}kx_1^2 + \frac{1}{2}kx_2^2 + \frac{1}{2}k(x_1 - x_2)^2$

B. $V = \frac{1}{2}kx_1^2 + \frac{3}{2}kx_2^2 + 3k(x_1 - x_2)^2$

C. $V = \frac{1}{2}kx_1^2 + \frac{3}{2}kx_2^2 + 3k(x_1 + x_2)^2$

D. $V = \frac{1}{2}kx_1^2 + \frac{1}{2}kx_2^2 + k(x_1 - x_2)^2$

E. Je ne sais pas