

-----1.

-1.

$$\text{solve}\left(\left\{\begin{array}{l} ra+rb+rc=w \\ rb \cdot l+(rc-w) \cdot 6 \cdot l=0 \end{array}\right\}, \{ra, rb\}\right) \quad l=0 \text{ and } ra=w-rc-\mathbf{c1} \text{ and } rb=\mathbf{c1} \text{ or } ra=-5 \cdot (w-rc) \text{ and } rb=6 \cdot (w-rc)$$

$$ra \cdot x | ra=-5 \cdot (w-rc) \text{ and } rb=6 \cdot (w-rc) \rightarrow m1 \quad -5 \cdot (w-rc) \cdot x$$

$$(rc-w) \cdot x | ra=-5 \cdot (w-rc) \text{ and } rb=6 \cdot (w-rc) \rightarrow m2 \quad -(w-rc) \cdot x$$

$$\int_0^l \frac{m1^2}{2 \cdot ei} dx + \int_0^{5 \cdot l} \frac{m2^2}{2 \cdot ei} dx + \frac{rc^2}{2 \cdot k} \Big|_k = \frac{ei}{2 \cdot (5 \cdot l)^3} \rightarrow u \quad \frac{25 \cdot l^3 \cdot (w^2 - 2 \cdot rc \cdot w + 6 \cdot rc^2)}{ei}$$


$$\text{solve}\left(\frac{d}{drc}(u)=0, rc\right) \quad rc=\frac{w}{6} \text{ or } l=0$$

$$u | rc=\frac{w}{6} \quad \frac{125 \cdot l^3 \cdot w^2}{6 \cdot ei}$$

$$\frac{d}{dw}(u) | rc=\frac{w}{6} \rightarrow dst \quad \frac{125 \cdot l^3 \cdot w}{3 \cdot ei}$$

-----2

2

 $1 + \sqrt{1 + \frac{2 \cdot h}{dst}} \rightarrow i$


$$\frac{\sqrt{\frac{5 \cdot (125 \cdot l^3 \cdot w + 6 \cdot h \cdot ei)}{l^3 \cdot w}} + 1}{25}$$

$i \cdot dst \rightarrow dmax$


$$\frac{5 \cdot l^3 \cdot w \cdot \left(\sqrt{\frac{5 \cdot (125 \cdot l^3 \cdot w + 6 \cdot h \cdot ei)}{l^3 \cdot w}} + 25 \right)}{3 \cdot ei}$$

-----3

-3

 $\frac{w}{dmax} \rightarrow k$

$$\frac{3 \cdot ei}{5 \cdot l^3 \cdot \left(\sqrt{\frac{5 \cdot (125 \cdot l^3 \cdot w + 6 \cdot h \cdot ei)}{l^3 \cdot w}} + 25 \right)}$$

 $\sqrt{\frac{k}{\frac{w}{g}}} | w = m \cdot g$

$$\frac{\sqrt{\frac{15 \cdot ei}{\left(\sqrt{\frac{5 \cdot (125 \cdot g \cdot l^3 \cdot m + 6 \cdot h \cdot ei)}{g \cdot l^3 \cdot m}} + 25 \right) \cdot l^3 \cdot m}}}{5}$$

-----1

1

$$\frac{12 \cdot 20000 \cdot 2}{4^3} \rightarrow k$$

7500

$$5 \cdot 2 \rightarrow m$$

10

$$\sqrt{\frac{k}{m}} \rightarrow \omega n$$

27.3861

$$2 \cdot \pi \cdot \sqrt{\frac{m}{k}} \rightarrow t n$$

0.229429

$$m \cdot 0.3 \cdot 10 \rightarrow f t$$

30.

-----2

-2

$$\text{deSolve}(m \cdot y'' + k \cdot y = f t \text{ and } y(0) = 0 \text{ and } y'(0) = 0, x, y)$$

$$y = 0.004 - 0.004 \cdot \cos(27.3861 \cdot x)$$

$$\text{fMax}(0.004 - 0.004 \cdot \cos(27.3861 \cdot x), x, 0, 5)$$

$$x = 0.22943 \cdot (n1 - 0.5) \text{ and } 1 \leq n1 \leq 22.$$

$$x = 0.22942972190928 \cdot (n1 - 0.5) | n1 = 1$$

$$x = 0.11471486$$

$$0.004 - 0.004 \cdot \cos(27.3861 \cdot x) | x = 0.11471486095464$$

0.008

-----3

3

$k \cdot 0.0079999999999971$	60.
------------------------------	-----

-----4	-4
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$\frac{-6 \cdot 20000 \cdot 0.008}{4^2}$	-60.
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[]

-----1

-1

$$\begin{bmatrix} m & 0 \\ 0 & 2 \cdot m \end{bmatrix} \rightarrow m0$$

$$\begin{bmatrix} m & 0 \\ 0 & 2 \cdot m \end{bmatrix}$$

-----2

-2

$$\begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 1 \end{bmatrix} \rightarrow a$$

$$\begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$$

$$\begin{bmatrix} k & 0 & 0 \\ 0 & k & 0 \\ 0 & 0 & 2 \cdot k \end{bmatrix} \rightarrow s$$

$$\begin{bmatrix} k & 0 & 0 \\ 0 & k & 0 \\ 0 & 0 & 2 \cdot k \end{bmatrix}$$

$$a \cdot s \cdot a^T \rightarrow k0$$

$$\begin{bmatrix} 2 \cdot k & -k \\ -k & 3 \cdot k \end{bmatrix}$$

-----3

3

$$\triangle \det(\omega n^2 \cdot m0 - k0) = 0$$

$$5 \cdot k^2 - 7 \cdot k \cdot m \cdot \omega n^2 + 2 \cdot m^2 \cdot \omega n^4 = 0$$

$$\triangle 5 \cdot k^2 - 7 \cdot k \cdot m \cdot \omega n^2 + 2 \cdot m^2 \cdot \omega n^4 = 0 | \omega n = \sqrt{x}$$

$$2 \cdot m^2 \cdot x^2 - 7 \cdot k \cdot m \cdot x + 5 \cdot k^2 = 0$$

$$\text{solve}(2 \cdot m^2 \cdot x^2 - 7 \cdot k \cdot m \cdot x + 5 \cdot k^2 = 0, x)$$

$$x = \frac{5 \cdot k}{2 \cdot m} \text{ or } x = \frac{k}{m}$$

$$\frac{1}{2 \cdot \pi} \cdot \sqrt{\frac{k}{m}}$$

$$0.159155 \cdot \sqrt{\frac{k}{m}}$$

$$\frac{1}{2 \cdot \pi} \cdot \sqrt{\frac{5 \cdot k}{2 \cdot m}}$$

$$0.251646 \cdot \sqrt{\frac{k}{m}}$$

[]

-----1

1

$$\triangle \text{ solve} \left(\det \left(\begin{bmatrix} -5-\lambda & 2 \\ 2 & -2-\lambda \end{bmatrix} \right) = 0, \lambda \right)$$

$$\lambda = -6 \text{ or } \lambda = -1$$

$$\text{solve} \left(\begin{bmatrix} -5-\lambda & 2 \\ 2 & -2-\lambda \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}, y \right) | \lambda = -1. \text{ and } x=1$$

$$y=2.$$

$$\text{solve} \left(\begin{bmatrix} -5-\lambda & 2 \\ 2 & -2-\lambda \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}, y \right) | \lambda = -6. \text{ and } x=1$$

$$y=-0.5$$

-----2

2

$$\text{eigVl} \left(\begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix} \right) \rightarrow vl$$

$$\{-6., -1.\}$$

$$\text{eigVc} \left(\begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix} \right) \rightarrow vc$$

$$\begin{bmatrix} -0.894427 & -0.447214 \\ 0.447214 & -0.894427 \end{bmatrix}$$

$$\frac{\begin{bmatrix} -0.894427 \\ 0.447214 \end{bmatrix}}{vc[1,1]}$$

$$\begin{bmatrix} 1. \\ -0.5 \end{bmatrix}$$

$$\frac{\begin{bmatrix} -0.447214 \\ -0.894427 \end{bmatrix}}{vc[1,2]}$$

$$\begin{bmatrix} 1. \\ 2. \end{bmatrix}$$

[]

$$\text{-----}1 \qquad -1$$

$$5760 \rightarrow k0 \qquad 5760$$

$$0.3 \rightarrow m0 \qquad 0.3$$

$$\text{-----}2 \qquad -2$$

$$\begin{bmatrix} m0 & 0 \\ 0 & m0 \end{bmatrix} \rightarrow m \qquad \begin{bmatrix} 0.3 & 0 \\ 0 & 0.3 \end{bmatrix}$$

$$\begin{bmatrix} k0+k0 & -k0 \\ -k0 & k0 \end{bmatrix} \rightarrow k \qquad \begin{bmatrix} 11520 & -5760 \\ -5760 & 5760 \end{bmatrix}$$

$$\text{-----}3 \qquad -3$$

$$w^2 \cdot m - k \qquad \begin{bmatrix} 0.3 \cdot w^2 - 11520 & 5760 \\ 5760 & 0.3 \cdot w^2 - 5760 \end{bmatrix}$$

$$\triangle \text{ solve}(\det(w^2 \cdot m - k) = 0, w) \qquad w = -224.201 \text{ or } w = -85.6373 \text{ or } w = 85.6373 \text{ or } w = 224.201$$

$$\text{-----}4 \qquad -4$$

$$\text{solve}\left(\left(\left(w^2 \cdot m - k\right) \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}\right) \begin{bmatrix} 1 & 1 \end{bmatrix}, y\right) | w = 85.6373 \text{ and } x = 1 \qquad y = 1.61803$$

$$\text{solve}\left(\left(\left(w^2 \cdot m - k\right) \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}\right) \begin{bmatrix} 1 & 1 \end{bmatrix}, y\right) | w=224.201 \text{ and } x=1$$

$$y = -0.618025$$

-----ex

-ex

$$\frac{1}{\left(\text{eigVl}(m^{-1}, k)\right)^2} \quad \{224.201, 85.6373\}$$

$$\text{eigVc}(m^{-1}, k) \quad \begin{bmatrix} 0.850651 & 0.525731 \\ -0.525731 & 0.850651 \end{bmatrix}$$

$$\frac{\begin{bmatrix} 0.85065080835204 & 0.52573111211913 \\ -0.52573111211913 & 0.85065080835204 \end{bmatrix}}{0.85065080835204} \quad \begin{bmatrix} 1. & 0.618034 \\ -0.618034 & 1. \end{bmatrix}$$

$$\frac{\begin{bmatrix} 0.85065080835204 & 0.52573111211913 \\ -0.52573111211913 & 0.85065080835204 \end{bmatrix}}{0.52573111211913} \quad \begin{bmatrix} 1.61803 & 1. \\ -1. & 1.61803 \end{bmatrix}$$

[]

$$\text{-----}1 \quad 1$$

$$\text{-----}2 \quad 2$$

$$2500 \cdot 1.2 \cdot 1.8 \cdot 0.5 \cdot \frac{(1.2)^2 + (0.5)^2}{12} \rightarrow izc \quad 380.25$$

$$380.25 + 2500 \cdot 1.2 \cdot 1.8 \cdot 0.5 \cdot (0.25)^2 \rightarrow izo \quad 549.$$

$$\text{-----}3 \quad 3$$

$$\sqrt{\frac{2 \cdot 10^6}{549}} \quad 60.3572$$

$$\text{-----}4 \quad 4$$

$$\sqrt{\frac{2 \cdot 10^6 - 2500 \cdot 1.2 \cdot 1.8 \cdot 0.5 \cdot 9.8 \cdot 0.25}{549}} \quad 60.257266$$

[]

-----1

1

$$\begin{bmatrix} \frac{-1}{3} & \frac{-1}{3} & \frac{-1}{3} & \frac{-1}{3} & \frac{-1}{3} & \frac{-1}{3} & 0 & 0 \\ & & 2 & 2 & 2 & 2 & & \\ 0 & 0 & 0 & 0 & \frac{1}{3} & \frac{1}{3} & \frac{-1}{3} & \frac{-1}{3} \\ & & & & \frac{2}{2} & \frac{2}{2} & \frac{2}{2} & \frac{2}{2} \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \rightarrow a$$

$$\begin{bmatrix} \frac{-1}{3} & \frac{-1}{3} & \frac{-2}{3} & \frac{-2}{3} & \frac{-2}{3} & \frac{-2}{3} & 0 & 0 \\ & & 2 & 2 & \frac{-2}{3} & \frac{-2}{3} & & \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} \frac{4 \cdot ei}{3} & \frac{2 \cdot ei}{3} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{2 \cdot ei}{3} & \frac{4 \cdot ei}{3} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{8 \cdot ei}{3} & \frac{4 \cdot ei}{3} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{4 \cdot ei}{3} & \frac{8 \cdot ei}{3} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{8 \cdot ei}{3} & \frac{4 \cdot ei}{3} & 0 & 0 \end{bmatrix} \rightarrow s$$

$$\begin{bmatrix} 0 & 0 & 0 & 0 & \frac{4 \cdot ei}{3} & \frac{8 \cdot ei}{3} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{8 \cdot ei}{3} & \frac{4 \cdot ei}{3} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{4 \cdot ei}{3} & \frac{8 \cdot ei}{3} \end{bmatrix}$$

$$\begin{bmatrix} \frac{4 \cdot ei}{3} & \frac{2 \cdot ei}{3} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{2 \cdot ei}{3} & \frac{4 \cdot ei}{3} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{8 \cdot ei}{3} & \frac{4 \cdot ei}{3} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{4 \cdot ei}{3} & \frac{8 \cdot ei}{3} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{8 \cdot ei}{3} & \frac{4 \cdot ei}{3} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{4 \cdot ei}{3} & \frac{8 \cdot ei}{3} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{8 \cdot ei}{3} & \frac{4 \cdot ei}{3} \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{4 \cdot ei}{3} & \frac{8 \cdot ei}{3} \end{bmatrix}$$

[3 3]

$$(a \cdot s \cdot a^T)^{-1} \cdot [p \ 0 \ 0 \ 0 \ 0]^T \rightarrow d$$

$$\begin{bmatrix} \frac{9 \cdot p}{16 \cdot ei} \\ \frac{9 \cdot p}{32 \cdot ei} \\ \frac{9 \cdot p}{32 \cdot ei} \\ \frac{9 \cdot p}{32 \cdot ei} \\ \frac{9 \cdot p}{16 \cdot ei} \end{bmatrix}$$



-----2

2

$$\frac{p}{d[1,1]}|_{ei=200000 \cdot 25.8 \cdot 10^6 \cdot 10^{-3} \cdot (10^{-3})^2}$$

9173.33

$$9.17333 \cdot 10^6 \rightarrow keq$$

9.17333E6

-----3

3

$$\text{solve}\left(\frac{20}{16} = e^{3 \cdot \frac{2 \cdot \pi \cdot \xi}{\sqrt{1-\xi^2}}}, \xi\right) \quad \xi=0.011837$$

-----4

4

$$\sqrt{\frac{k_{eq}}{500 \cdot 10^3}} \rightarrow \omega_n \quad 13.4157$$

$$\omega_n \cdot \sqrt{1-\xi^2} \mid \xi=0.011837303651169 \rightarrow \omega_d \quad 13.4147$$

-----5

5

$$2 \cdot \sqrt{\frac{500 \cdot 10^3}{9.81}} \cdot k_{eq} \rightarrow c_{cr} \quad 1.36755\text{E}6$$

$$c_{cr} \cdot \xi \mid \xi=0.011837303651169 \rightarrow c \quad 16188.1$$

-----6

6

$$\text{solve}\left(\frac{20}{u11} = e^{10 \cdot \frac{2 \cdot \pi \cdot 0.011837}{\sqrt{1 - (0.011837)^2}}}, u11\right)$$

$$u11=9.50616$$

□

-----1

1

$$\begin{bmatrix} 1.5 & 0 \\ 0 & 1 \end{bmatrix} \rightarrow m$$

$$\begin{bmatrix} 1.5 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1500 & -500 \\ -500 & 500 \end{bmatrix} \rightarrow k$$

$$\begin{bmatrix} 1500 & -500 \\ -500 & 500 \end{bmatrix}$$

-----2

2

$$\triangle \text{ solve}(\det(w n^2 \cdot m - k) = 0, w n) | w n > 0$$

$$w n = 16.4708 \text{ or } w n = 35.053$$

$$\triangle \text{ exp} \triangleright \text{list}(\text{solve}(\det(w n^2 \cdot m - k) = 0, w n) | w n > 0, w n) \rightarrow w$$

$$\{16.4708, 35.053\}$$

$$\frac{w}{2 \cdot \pi} \rightarrow f$$

$$\{2.62141, 5.57886\}$$

-----3

3

$$(w n^2 \cdot m - k) \cdot \begin{bmatrix} x1 \\ x2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \rightarrow \varphi$$

$$\begin{bmatrix} 1.5 \cdot w n^2 \cdot x1 - 1500 \cdot x1 + 500 \cdot x2 = 0 \\ w n^2 \cdot x2 + 500 \cdot x1 - 500 \cdot x2 = 0 \end{bmatrix}$$

$$\text{solve}(\varphi[1,1], x2) | x1 = 1 \text{ and } w n = w[1]$$

$$x2 = 2.18614$$

$$\text{solve}(\varphi[1,1], x2) | x1 = 1 \text{ and } w n = w[2]$$

$$x2 = -0.686141$$

-----#check-up

"Error: Argument must be a string"

$$\text{eigVl}\left(\sqrt{m^{-1} \cdot k}\right) \quad \{35.053, 16.4708\}$$

$$\text{eigVc}\left(\sqrt{m^{-1} \cdot k}\right) \rightarrow vc \quad \begin{bmatrix} 0.824565 & 0.415974 \\ -0.565767 & 0.909377 \end{bmatrix}$$

$$\frac{vc}{vc[1,1]} \quad \begin{bmatrix} 1. & 0.504476 \\ -0.686141 & 1.10286 \end{bmatrix}$$

$$\frac{vc}{vc[1,2]} \quad \begin{bmatrix} 1.98225 & 1. \\ -1.3601 & 2.18614 \end{bmatrix}$$

[]

-----1

-1

$$\begin{bmatrix} 2 \cdot m & 0 \\ 0 & m \end{bmatrix} \rightarrow m0$$

$$\begin{bmatrix} 2 \cdot m & 0 \\ 0 & m \end{bmatrix}$$

$$\begin{bmatrix} 3 \cdot k & -k \\ -k & k \end{bmatrix} \rightarrow k0$$

$$\begin{bmatrix} 3 \cdot k & -k \\ -k & k \end{bmatrix}$$

-----2

-2

solve($\det(-wn^2 \cdot m0 + k0) = 0, wn$) | $k > 0$ and $m > 0$ and $wn > 0$



$$wn = \frac{\sqrt{2 \cdot k}}{2 \cdot \sqrt{m}} \text{ and } k > 0 \text{ and } m > 0 \text{ or } wn = \frac{\sqrt{2 \cdot k}}{\sqrt{m}} \text{ and } k > 0 \text{ and } m > 0$$

$$\frac{\sqrt{2 \cdot k}}{2 \cdot \sqrt{m}} | k=500000 \text{ and } m=10000 \rightarrow wn1$$

5

$$\frac{\sqrt{2 \cdot k}}{\sqrt{m}} | k=500000 \text{ and } m=10000 \rightarrow wn2$$

10

$$\frac{2 \cdot \pi}{wn1} \rightarrow tn1$$

1.25664

$$\frac{2 \cdot \pi}{\omega n^2} \rightarrow tn2 \quad 0.628319$$

$$-----3 \quad -3$$

$$(-\omega n^2 \cdot m0 + k0) \cdot \begin{bmatrix} u1 \\ u2 \end{bmatrix} |_{k=500000 \text{ and } m=10000} \rightarrow sol1 \quad \begin{bmatrix} 1000000 \cdot u1 - 500000 \cdot u2 \\ 250000 \cdot u2 - 500000 \cdot u1 \end{bmatrix}$$

$$(-\omega n^2 \cdot m0 + k0) \cdot \begin{bmatrix} u1 \\ u2 \end{bmatrix} |_{k=500000 \text{ and } m=10000} \rightarrow sol2 \quad \begin{bmatrix} -500000 \cdot u1 - 500000 \cdot u2 \\ -500000 \cdot u1 - 500000 \cdot u2 \end{bmatrix}$$

$$\text{solve}(sol1[1,1]=0, u1) | u2=1 \quad u1=0.5$$

$$\text{solve}(sol2[1,1]=0, u1) | u2=1 \quad u1=-1.$$

©-----Numeric solution

$$\begin{bmatrix} 2 \cdot m & 0 \\ 0 & m \end{bmatrix} |_{m=10000} \rightarrow m1 \quad \begin{bmatrix} 20000 & 0 \\ 0 & 10000 \end{bmatrix}$$

$$\begin{bmatrix} 3 \cdot k & -k \\ -k & k \end{bmatrix} |_{k=500000} \rightarrow k1 \quad \begin{bmatrix} 1500000 & -500000 \\ -500000 & 500000 \end{bmatrix}$$

$$\text{eigVl}(\sqrt{m1^{-1} \cdot k1}) \rightarrow vl \quad \{10., 5.\}$$

$$\text{eigVc}\left(\sqrt{mI^{-1} \cdot kI}\right) \rightarrow vc$$

$$\begin{bmatrix} 0.707107 & 0.447214 \\ -0.707107 & 0.894427 \end{bmatrix}$$

[]

-----1

1

$$\text{expand}(m1 \cdot u1'' + k1 \cdot u1 + m2 \cdot (u1'' + l \cdot \theta'') + k2 \cdot (u1 + l \cdot \theta) = 0) \quad l \cdot k2 \cdot \theta + l \cdot m2 \cdot \theta'' + k1 \cdot u1 + k2 \cdot u1 + m1 \cdot u1'' + m2 \cdot u1'' = 0$$

$$\text{expand}(k2 \cdot (u1 + l \cdot \theta) \cdot l + m2 \cdot (u1'' + l \cdot \theta'') \cdot l = 0) \quad l^2 \cdot k2 \cdot \theta + l^2 \cdot m2 \cdot \theta'' + l \cdot k2 \cdot u1 + l \cdot m2 \cdot u1'' = 0$$

$$\begin{bmatrix} m1 + m2 & m2 \cdot l \\ m2 \cdot l & m2 \cdot l^2 \end{bmatrix} \Big|_{m1=2 \text{ and } m2=1 \text{ and } l=3 \rightarrow m0} \quad \begin{bmatrix} 3 & 3 \\ 3 & 9 \end{bmatrix}$$

$$\begin{bmatrix} k1 + k2 & k2 \cdot l \\ k2 \cdot l & k2 \cdot l^2 + m2 \cdot g \cdot l \end{bmatrix} \Big|_{k1=6 \text{ and } k2=2 \text{ and } m2=1 \text{ and } l=3 \text{ and } g=9.8 \rightarrow k0} \quad \begin{bmatrix} 8 & 6 \\ 6 & 47.4 \end{bmatrix}$$

-----2

2

$$\triangle \text{ solve}(\det(m0 \cdot wn^2 - k0) = 0, wn) \quad wn = -2.69842 \text{ or } wn = -1.61818 \text{ or } wn = 1.61818 \text{ or } wn = 2.69842$$

$$(m0 \cdot (1.61818)^2 - k0) \cdot \begin{bmatrix} u \\ \theta \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \rightarrow \text{mode1} \quad \begin{bmatrix} 1.85552 \cdot \theta - 0.14448 \cdot u = 0 \\ 1.85552 \cdot u - 23.8334 \cdot \theta = 0 \end{bmatrix}$$

$$\text{solve}(\text{mode1}[1,1], \theta) \quad \theta = 0.077865 \cdot u$$

$$(m0 \cdot (2.69842)^2 - k0) \cdot \begin{bmatrix} u \\ \theta \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \rightarrow \text{mode2} \quad \begin{bmatrix} 13.8444 \cdot u + 15.8444 \cdot \theta = 0 \\ 15.8444 \cdot u + 18.1332 \cdot \theta = 0 \end{bmatrix}$$

$$\text{solve}(\text{mode2}[1,1], \theta) \quad \theta = -0.873773 \cdot u$$

-----3

3

$$\text{eigVl}\left(\sqrt{m0^{-1} \cdot k0}\right) \quad \{1.61818, 2.69842\}$$

$$\text{eigVc}\left(\sqrt{m0^{-1} \cdot k0}\right) \quad \begin{bmatrix} -0.996983 & 0.753034 \\ -0.07762 & -0.657981 \end{bmatrix}$$

$$\frac{\begin{bmatrix} -0.996983 \\ -0.07762 \end{bmatrix}}{-0.996983} \quad \begin{bmatrix} 1. \\ 0.077855 \end{bmatrix}$$

$$\frac{\begin{bmatrix} 0.753034 \\ -0.657981 \end{bmatrix}}{0.753034} \quad \begin{bmatrix} 1. \\ -0.873773 \end{bmatrix}$$

-----g=0

g=0

$$\begin{bmatrix} k1+k2 & k2 \cdot l \\ k2 \cdot l & k2 \cdot l^2 \end{bmatrix} \Big|_{k1=6 \text{ and } k2=2 \text{ and } m2=1 \text{ and } l=3 \text{ and } g=9.8 \rightarrow kk0} \quad \begin{bmatrix} 8 & 6 \\ 6 & 18 \end{bmatrix}$$

$$\text{eigVl}\left(\sqrt{m0^{-1} \cdot kk0}\right) \quad \{1.41421, 1.73205\}$$

$$\text{eigVc}\left(\sqrt{m0^{-1} \cdot kk0}\right) \quad \begin{bmatrix} 0. & 0.948683 \\ 1. & -0.316228 \end{bmatrix}$$

$$\begin{bmatrix} 0.948683 \\ -0.316228 \end{bmatrix}$$

$$0.948683$$

$$\begin{bmatrix} 1. \\ -0.333334 \end{bmatrix}$$

[]

-----1.

1.

$$\begin{bmatrix} 2 \cdot m & 0 \\ 0 & m \end{bmatrix} \rightarrow mm$$

$$\begin{bmatrix} 2 \cdot m & 0 \\ 0 & m \end{bmatrix}$$

$$\begin{bmatrix} k1+k2 & -k2 \\ -k2 & k2 \end{bmatrix} \left| k1 = \frac{24 \cdot ei}{h^3} \text{ and } k2 = \frac{6 \cdot ei}{h^3} \right. \rightarrow kk$$

$$\begin{bmatrix} \frac{30 \cdot ei}{h^3} & \frac{-6 \cdot ei}{h^3} \\ \frac{-6 \cdot ei}{h^3} & \frac{6 \cdot ei}{h^3} \end{bmatrix}$$

-----2

2

$$\text{solve}(\det(kk - wn^2 \cdot mm) = 0, wn)$$

$$\triangleleft wn = 4.08469 \cdot \sqrt{\frac{ei}{h^3 \cdot m}} \text{ and } \frac{ei}{h^3 \cdot m} \geq 0. \text{ or } wn = 2.07734 \cdot \sqrt{\frac{ei}{h^3 \cdot m}} \text{ and } \frac{ei}{h^3 \cdot m} \geq 0. \text{ or } wn = -2.07734 \cdot \sqrt{\frac{ei}{h^3 \cdot m}} \text{ and } \frac{ei}{h^3 \cdot m} \geq 0.$$

-----3


-3

$$(-wn^2 \cdot mm + kk) \cdot \begin{bmatrix} x1 \\ x2 \end{bmatrix} \left| wn = 2.07734 \cdot \sqrt{\frac{ei}{h^3 \cdot m}} \right. \rightarrow \varphi 1$$

$$\begin{bmatrix} \frac{ei \cdot (21.3693 \cdot x1 - 6 \cdot x2)}{h^3} \\ \frac{ei \cdot (1.68466 \cdot x2 - 6 \cdot x1)}{h^3} \end{bmatrix}$$

$$\text{solve}(\varphi 1[1,1]=0, x1) | x2=1$$

$$x1=0.280776 \text{ or } \frac{ei}{h^3}=0.$$



$$(-wn^2 \cdot mm + kk) \cdot \begin{bmatrix} x1 \\ x2 \end{bmatrix} | wn=4.08469 \cdot \sqrt{\frac{ei}{h^3 \cdot m}} \rightarrow \varphi 2$$


$$\begin{bmatrix} \frac{ei \cdot (-3.36938 \cdot x1 - 6 \cdot x2)}{h^3} \\ \frac{ei \cdot (-6 \cdot x1 - 10.6847 \cdot x2)}{h^3} \end{bmatrix}$$

$$\text{solve}(\varphi 2[1,1]=0, x1) | x2=1$$

$$x1=-1.78074 \text{ or } \frac{ei}{h^3}=0.$$

$$\text{-----}4.$$

$$4.$$




$$a1 \cdot \begin{bmatrix} 0.280776 \\ 1 \end{bmatrix} + a2 \cdot \begin{bmatrix} -1.78074 \\ 1 \end{bmatrix} = kk^{-1} \cdot \begin{bmatrix} 0 \\ f0 \end{bmatrix} \rightarrow q$$

$$\begin{bmatrix} 0.280776 \cdot a1 - 1.78074 \cdot a2 = \frac{h^3 \cdot f0}{24 \cdot ei} \\ a1 + a2 = \frac{5 \cdot h^3 \cdot f0}{24 \cdot ei} \end{bmatrix}$$

$$\text{solve}(q[1,1] \text{ and } q[2,1], \{a1, a2\})$$

$$a1 = \frac{0.20017 \cdot h^3 \cdot f0}{ei} \text{ and } a2 = \frac{0.008163 \cdot h^3 \cdot f0}{ei} \text{ and } ei \neq 0.$$

 $\frac{a_2}{a_1} | a_1 = \frac{0.2001702468798 \cdot h^3 \cdot f_0}{e_i}$ and $a_2 = \frac{0.008163086453529 \cdot h^3 \cdot f_0}{e_i}$ and $e_i \neq 0$.

0.040781

□

12-archi-3

-----1. <i>properties</i>	<i>properties</i>
$9.807 \rightarrow g$	9.807
$5 \cdot 10^6 \rightarrow w$	5000000
$5 \cdot 10^5 \rightarrow p$	500000
$\frac{5 \cdot 10^6}{g} \rightarrow m$	509840.
$1000 \cdot \frac{10^3}{10^{-3}} \rightarrow k$	1000000000
$\sqrt{\frac{k}{m}} \rightarrow wn$	44.2877
-----2. <i>t < 0.02</i>	<i>-2. t < 0.02</i>
$\text{deSolve}\left(y1'' + wn^2 \cdot y1 = \frac{p}{m} \text{ and } y1(0)=0 \text{ and } y1'(0)=0, t, y1\right)$	$y1 = 0.0005 - 0.0005 \cdot \cos(44.2877 \cdot t)$
$4.999999999999999\text{E-}4 - 4.999999999999999\text{E-}4 \cdot \cos(44.287695808204 \cdot t) \rightarrow y1$	$0.0005 - 0.0005 \cdot \cos(44.2877 \cdot t)$

$$y1|_{t=0.02} \rightarrow \delta 1 \quad 0.000184$$

$$\frac{d}{dt}(y1)|_{t=0.02} \rightarrow \theta 1 \quad 0.017148$$

$$\text{-----} 3. \cdot t > 0.02 \quad -3. \cdot t > 0.02$$

$$\text{deSolve}\left(y2'' + \omega n^2 \cdot y2 = \frac{-P}{m} \text{ and } y2(0) = \delta 1 \text{ and } y2'(0) = \theta 1, t, y2\right)$$

$$y2 = 0.000684 \cdot \cos(44.2877 \cdot t) + 0.000387 \cdot \sin(44.2877 \cdot t) - 0.0005$$

$$6.8364707272614E-4 \cdot \cos(44.287695808204 \cdot t) + 3.8719610716698E-4 \cdot \sin(44.287695808204 \cdot t) - 4.9999999999999E-5$$

$$0.000684 \cdot \cos(44.2877 \cdot t) + 0.000387 \cdot \sin(44.2877 \cdot t) - 0.0005$$

$$y1 + y2 \quad 0.000184 \cdot \cos(44.2877 \cdot t) + 0.000387 \cdot \sin(44.2877 \cdot t)$$

$$y1 + y2|_{t=x-0.02} \rightarrow y3 \quad 0.000184 \cdot \cos(44.2877 \cdot x - 0.885754) + 0.000387 \cdot \sin(44.2877 \cdot x - 0.885754)$$

$$\text{fMax}(y3, x) | 0 < x$$

$$x = 0.070936 \cdot (n8 + 0.640972) \text{ and } \cos(3.14159 \cdot n8) > 0. \text{ and } n8 + 0.640972 > 0. \text{ and } n8 \geq 0. \text{ or } x = 1.E-38$$

$$0.070936 \cdot 0.640972 \quad 0.045468$$

$$y3|x = 0.045467989792 \quad 0.000429$$

$$0.070936 \cdot (n + 0.640972) | n = \{ 0, 1, 2, 3 \} \quad \{ 0.045468, 0.116404, 0.18734, 0.258276 \}$$

-----4. v_{max}

-4. v_{max}

$k \cdot 4.2854063135954 \cdot 10^{-3}$

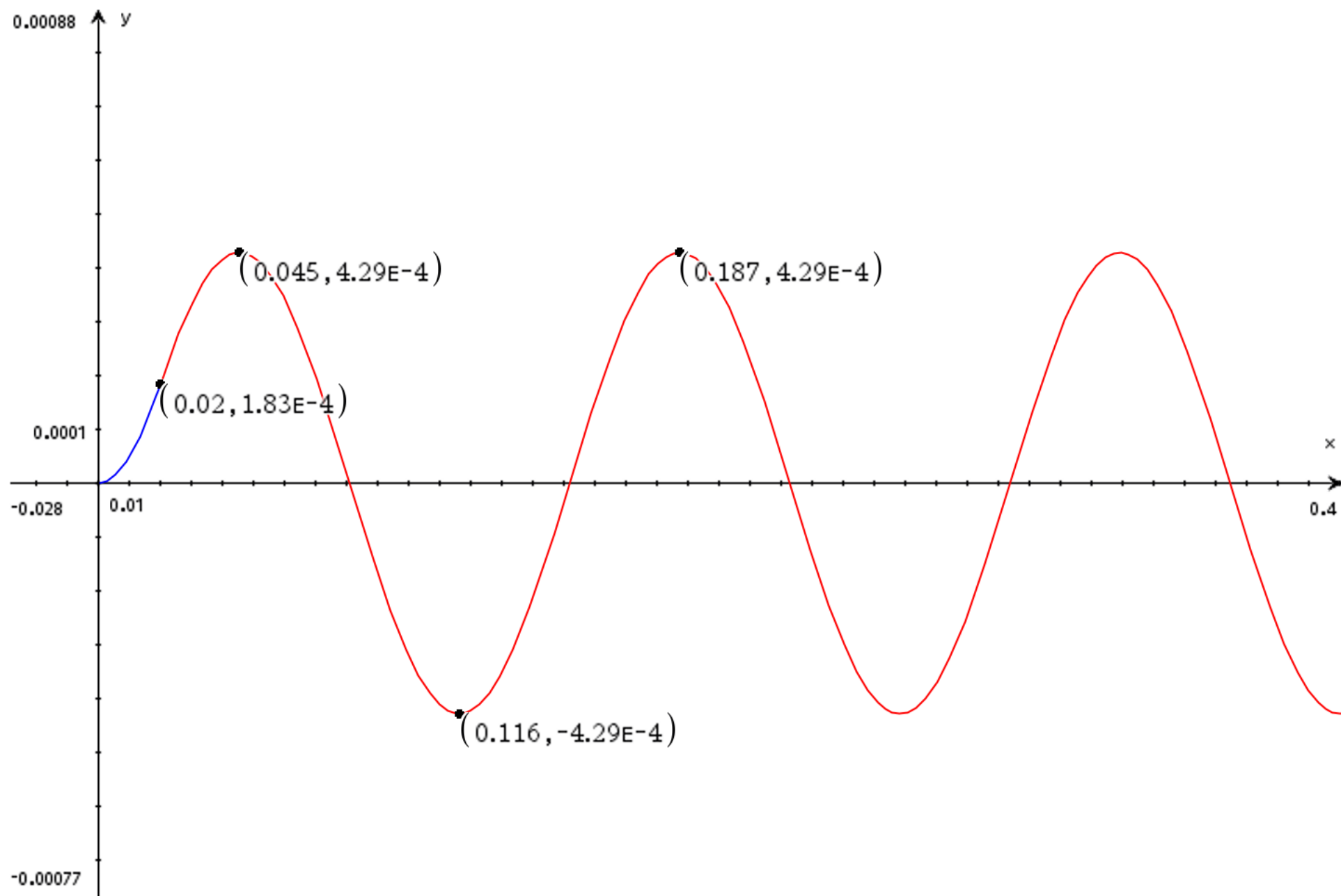
428.541

428.54063135954

214.27

2

[]



-----1

1

$$\frac{3 \cdot 21000 \cdot 51840}{400^3} \rightarrow k1$$

51.03

$$\frac{12 \cdot 21000 \cdot 51840}{600^3} \rightarrow k2$$

60.48

$$k1 + k2 \rightarrow keq$$

111.51

$$\frac{196}{980} \rightarrow m$$

0.2

$$\sqrt{\frac{keq}{m}} \rightarrow \omega n$$

23.6125

$$\frac{2 \cdot \pi}{\omega n} \rightarrow tn$$

0.266096

-----2

-2

$$a \cdot \sin(\omega n \cdot t) + b \cdot \cos(\omega n \cdot t) \rightarrow y$$

$$b \cdot \cos(23.6125 \cdot t) + a \cdot \sin(23.6125 \cdot t)$$

-----3

-3

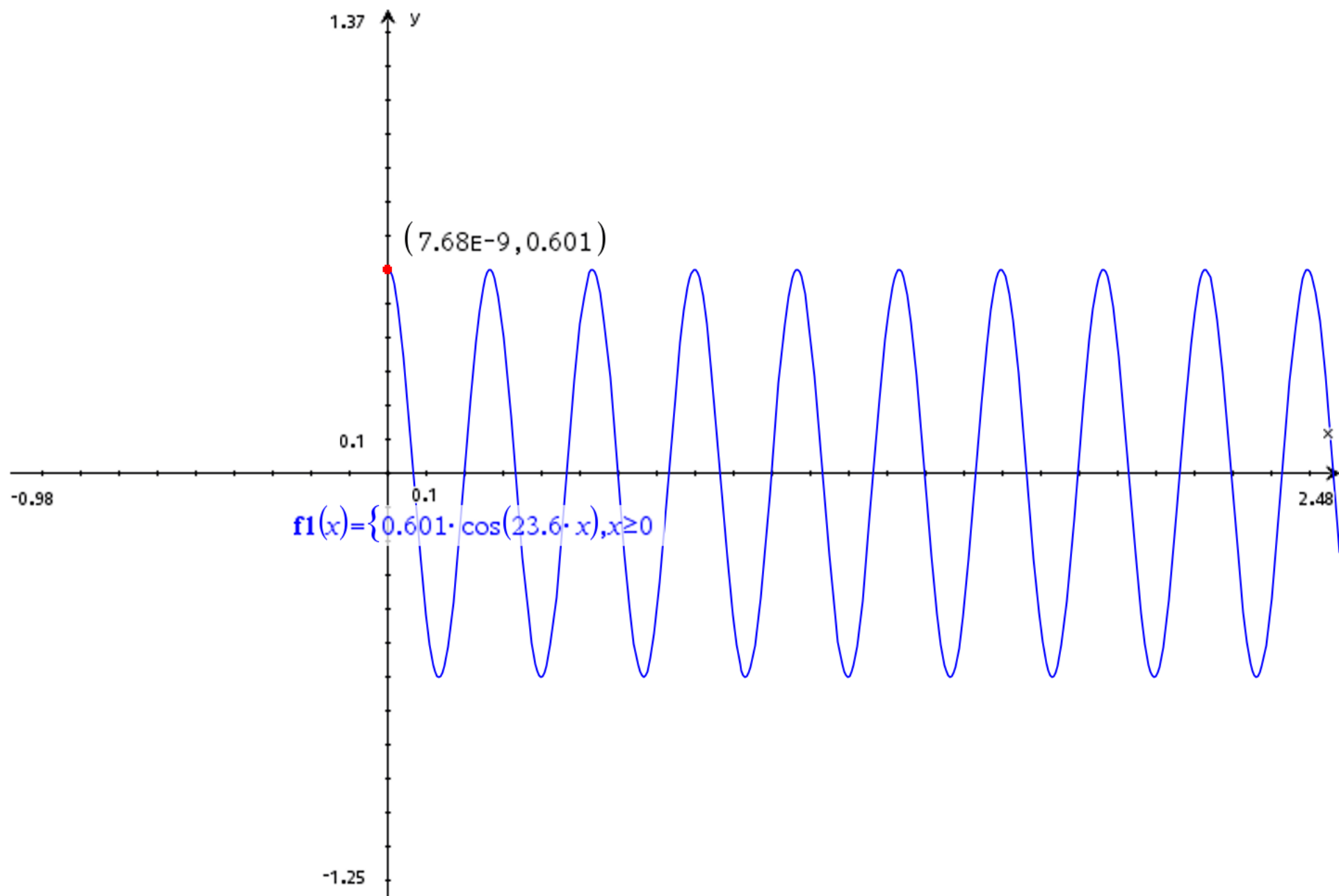
$$\text{solve} \left(\begin{cases} y = \frac{67}{keq} |_{t=0} \\ \frac{d}{dt}(y) = 0 |_{t=0} \end{cases}, \{a, b\} \right)$$

$$a=0. \text{ and } b=0.600843$$

$$y|_{a=0. \text{ and } b=0.60084297372433}$$

$$0.600843 \cdot \cos(23.6125 \cdot t)$$

[]



-----1

1

 $9000 \rightarrow k$

9000

 $\frac{600}{9.8} \rightarrow m$

61.2245

 $\sqrt{\frac{k}{m}} \rightarrow \omega n$

12.1244

-----2

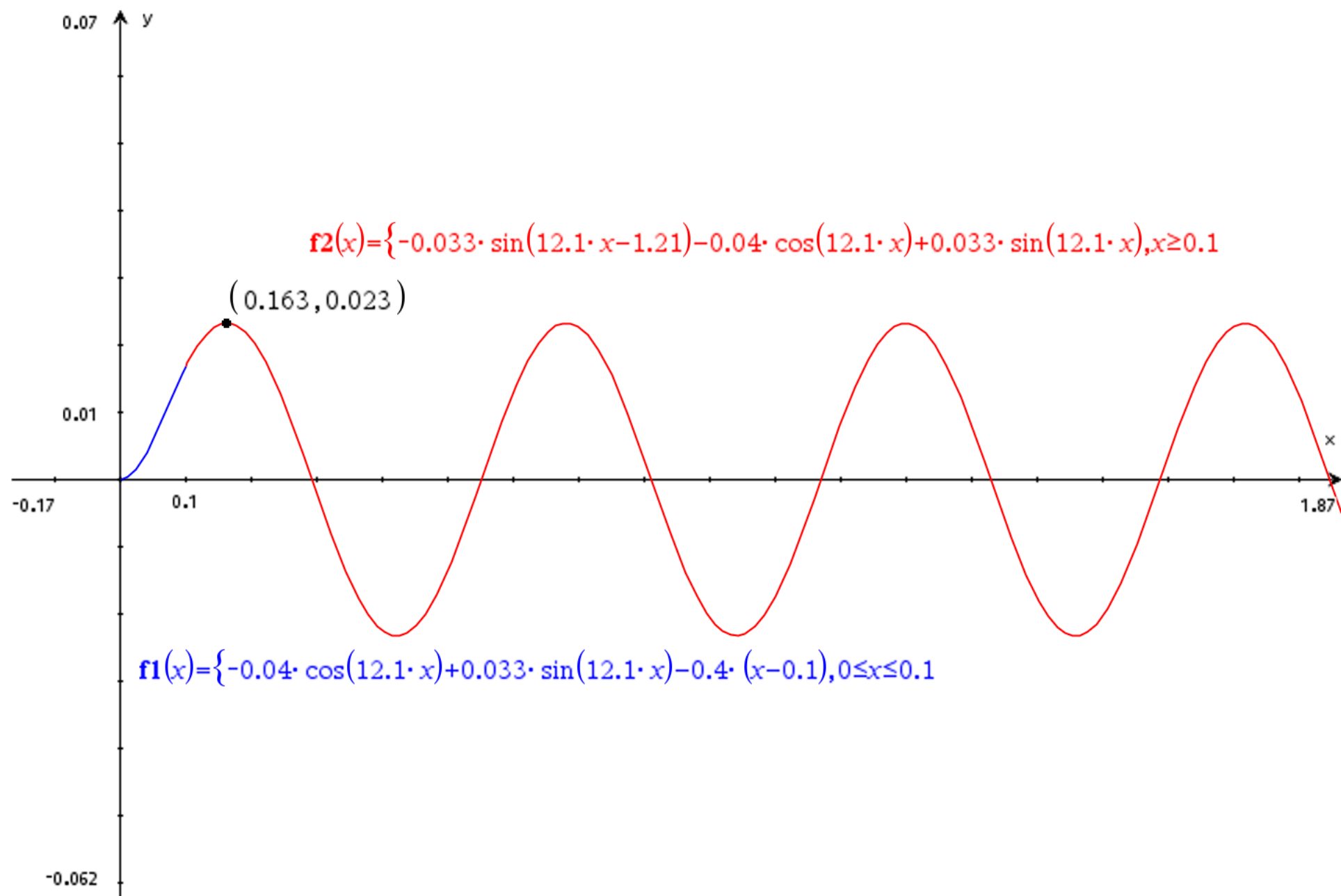
2

deSolve $\left(m \cdot y1'' + k \cdot y1 = \frac{-360}{0.1} \cdot t + 360 \text{ and } y1(0)=0 \text{ and } y1'(0)=0, t, y1\right)$ $y1 = -0.04 \cdot \cos(12.1244 \cdot t) + 0.032991 \cdot \sin(12.1244 \cdot t) - 0.4 \cdot (t - 0.1)$ $-0.04 \cdot \cos(12.124355652982 \cdot t) + 0.032991443953693 \cdot \sin(12.124355652982 \cdot t) - 0.4 \cdot (t - 0.1) \rightarrow y1$ $-0.04 \cdot \cos(12.1244 \cdot t) + 0.032991 \cdot \sin(12.1244 \cdot t) - 0.4 \cdot (t - 0.1)$ deSolve $\left(m \cdot y2'' + k \cdot y2 = \frac{360}{0.1} \cdot t \text{ and } y2(0)=0 \text{ and } y2'(0)=0, t, y2\right)$ $y2 = 0.4 \cdot t - 0.032991 \cdot \sin(12.1244 \cdot t)$ $0.4 \cdot t - 0.032991443953693 \cdot \sin(12.124355652982 \cdot t) \rightarrow y2$ $0.4 \cdot t - 0.032991 \cdot \sin(12.1244 \cdot t)$

-----3

-3

$y1 t=x \rightarrow y3$	$-0.04 \cdot \cos(12.1244 \cdot x) + 0.032991 \cdot \sin(12.1244 \cdot x) - 0.4 \cdot (x - 0.1)$
$(y1 t=x) + (y2 t=x-0.1) \rightarrow y4$	$-0.032991 \cdot \sin(12.1244 \cdot x - 1.21244) - 0.04 \cdot \cos(12.1244 \cdot x) + 0.032991 \cdot \sin(12.1244 \cdot x)$
-----4	4
$fMax(y4,x) 0.1 \leq x \leq 0.3$	$x=0.162706$
$y4 x=0.16270572243163$	0.023275
$k \cdot 0.023274625135629$	209.472
[]	



PE.A-94-3-3(CONVOL)

-----0

0

$9000 \rightarrow k$

9000

$\frac{600}{9.8} \rightarrow m$

61.2245

$\sqrt{\frac{k}{m}} \rightarrow \omega n$

12.1244

-----1

-1

$$\frac{1}{m \cdot \omega n} \cdot \int_0^t \left(\left(\frac{-360}{0.1} \cdot \tau + 360 \right) \cdot \sin(\omega n \cdot (t - \tau)) \right) d\tau \rightarrow y1$$

$$-0.04 \cdot (\cos(12.1244 \cdot t) - 0.824786 \cdot (\sin(12.1244 \cdot t) - 12.1244 \cdot (t - 0.1)))$$

$y1|_{t=x} \rightarrow y3$

$$-0.04 \cdot (\cos(12.1244 \cdot x) - 0.824786 \cdot (\sin(12.1244 \cdot x) - 12.1244 \cdot (x - 0.1)))$$

-----2

-2

$y3|_{x=0.1}$

0.016866

$$\frac{d}{dx}(y^3)|_{x=0.1}$$

$$0.194461$$

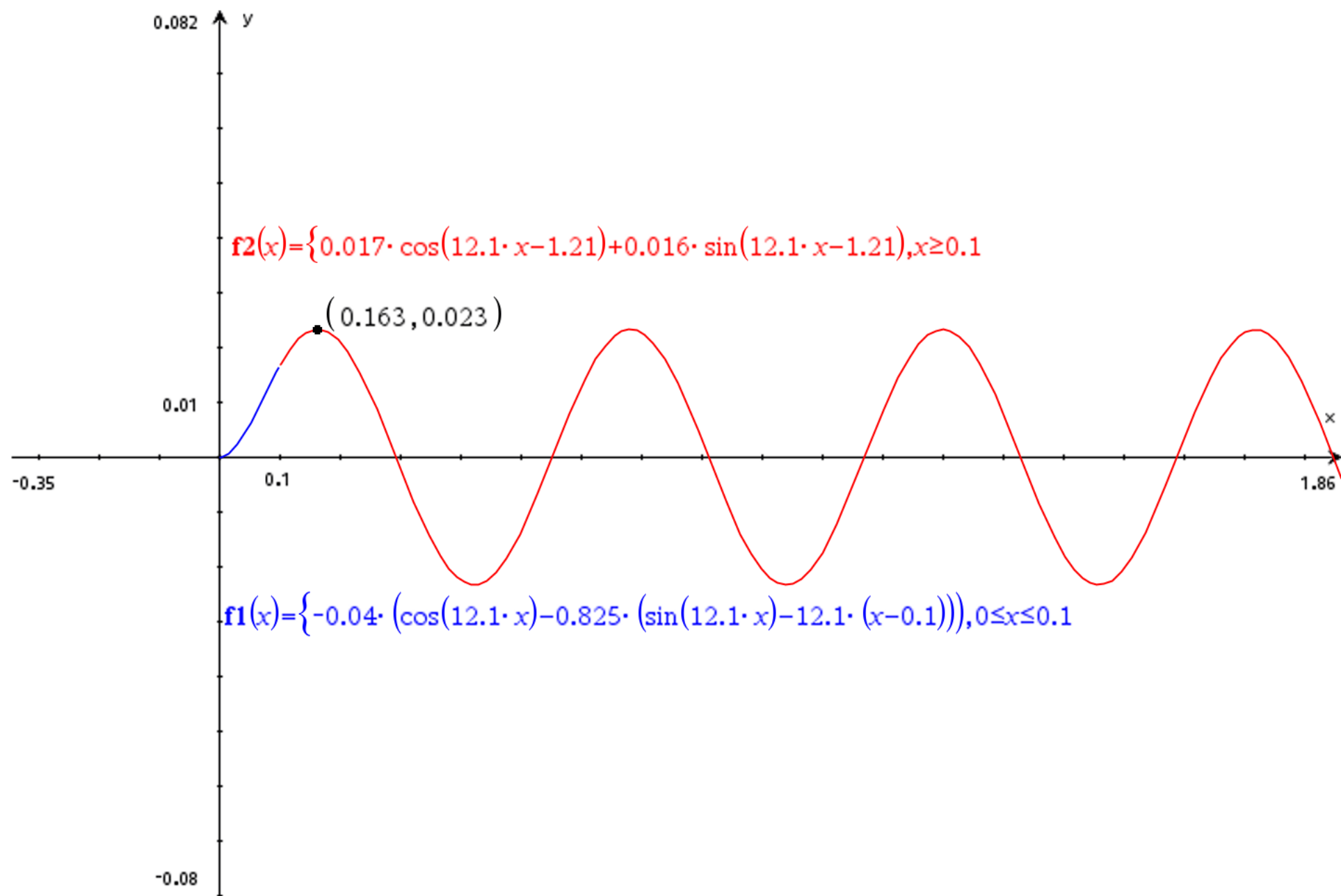
$$\frac{0.19446112280626}{wn} \cdot \sin(wn \cdot t) + 0.016866013298075 \cdot \cos(wn \cdot t) + \frac{1}{m \cdot wn} \cdot \int_0^t (0 \cdot \sin(wn \cdot (t-\tau))) d\tau \rightarrow y_2$$

$$0.016866 \cdot \cos(12.1244 \cdot t) + 0.016039 \cdot \sin(12.1244 \cdot t)$$

$$y_2|_{t=x-0.1} \rightarrow y_4$$

$$0.016866 \cdot \cos(12.1244 \cdot x - 1.21244) + 0.016039 \cdot \sin(12.1244 \cdot x - 1.21244)$$

$$[]$$



$$\text{-----}1 \qquad 1$$

$$\frac{68}{9.8} \rightarrow m \qquad 6.93878$$

$$\frac{3 \cdot 200000 \cdot 28800000}{4500^3} \cdot 2 \rightarrow k \qquad 379.259$$

$$\frac{900}{k} \rightarrow dst \qquad 2.37305$$

$$\sqrt{\frac{k}{m}} \rightarrow wn \qquad 7.3931$$

$$wn \cdot \sqrt{1 - (0.05)^2} \rightarrow wd \qquad 7.38385$$

$$5.3 \rightarrow w0 \qquad 5.3$$

$$\frac{w0}{wn} \rightarrow r \qquad 0.716885$$

$$\text{-----}2 \qquad 2$$

$$\frac{-2 \cdot 0.05 \cdot r \cdot dst}{(1-r^2)^2 + (2 \cdot 0.05 \cdot r)^2} \quad -0.704694$$

$$\frac{(1-r^2) \cdot dst}{(1-r^2)^2 + (2 \cdot 0.05 \cdot r)^2} \quad 4.77811$$

$$e^{-0.05 \cdot wn \cdot t} \cdot (c1 \cdot \cos(wd \cdot t) + c2 \cdot \sin(wd \cdot t)) + -0.70469604952852 \cdot \cos(w0 \cdot t) + 4.7781183902246 \cdot \sin(w0 \cdot t) \rightarrow y$$

$$(0.690973)^t \cdot (c1 \cdot \cos(7.38385 \cdot t) + c2 \cdot \sin(7.38385 \cdot t) - 0.704696 \cdot (1.44724)^t \cdot (\cos(5.3 \cdot t) - 6.7804 \cdot \sin(5.3 \cdot t)))$$

$$\text{solve} \left(\begin{cases} y=0|t=0 \\ \frac{d}{dt}(y)=0|t=0 \end{cases}, \{c1, c2\} \right) \quad c1=0.704696 \text{ and } c2=-3.39437$$

$$(0.69097261794223)^t \cdot (c1 \cdot \cos(7.3838544940663 \cdot t) + c2 \cdot \sin(7.3838544940663 \cdot t)) | c1=0.70469604952852 \text{ and } c2=-3 \cdot$$

$$0.704696 \cdot (0.690973)^x \cdot (\cos(7.38385 \cdot x) - 4.81679 \cdot \sin(7.38385 \cdot x))$$

$$(0.69097261794223)^t \cdot -0.70469604952852 \cdot (1.4472353520724)^t \cdot (\cos(5.3 \cdot t) - 6.7803961628867 \cdot \sin(5.3 \cdot t)) | t=x \rightarrow yp$$

$$-0.704696 \cdot (1.)^x \cdot (\cos(5.3 \cdot x) - 6.7804 \cdot \sin(5.3 \cdot x))$$

$$\frac{dst}{\sqrt{(1-r^2)^2 + (2 \cdot 0.05 \cdot r)^2}} \quad 4.8298$$

$$-----4.1 \quad -4.1$$

$$4.8297978548479 \cdot k \quad 1831.75$$

$$\frac{1831.7455568016}{2} \cdot 4500 \quad 4.12143E6$$

$$\frac{4121427.5028036}{278600} \quad 14.7934$$

$$-----4.2 \quad -4.2$$

$$yp \quad -0.704696 \cdot (\cos(5.3 \cdot x) - 6.7804 \cdot \sin(5.3 \cdot x))$$

$$yh \quad 0.704696 \cdot (0.690973)^x \cdot (\cos(7.38385 \cdot x) - 4.81679 \cdot \sin(7.38385 \cdot x))$$

$$yp+yh \quad 0.704696 \cdot (0.690973)^x \cdot (\cos(7.38385 \cdot x) - 4.81679 \cdot (\sin(7.38385 \cdot x) + 0.207607 \cdot (1.44724)^x \cdot (\cos(5.3 \cdot x) - 6.7804 \cdot \sin(5.3 \cdot x))))$$

$$-----duhamel \quad duhamel$$

$$\frac{1}{m \cdot wd} \cdot \int_0^x \left(900 \cdot \sin(5.3 \cdot \tau) \cdot e^{-0.05 \cdot wd \cdot (x-\tau)} \cdot \sin(wd \cdot (x-\tau)) \right) d\tau \rightarrow ydm$$

$$0.692167 \cdot (0.690973)^x \cdot \left(\sin(7.38385 \cdot x - 0.029136) - 5.99571 \cdot \left(\sin(7.38385 \cdot x - 0.175564) - 0.166786 \cdot (1.44724)^x \cdot \sin(7.38385 \cdot x - 0.175564) \right) \right)$$

$ydm|x=1.51$ 6.81108

-----*desolve_function* *desolve_function*

m 6.93878

$$2 \cdot 0.05 \cdot \sqrt{m \cdot k} \rightarrow c$$

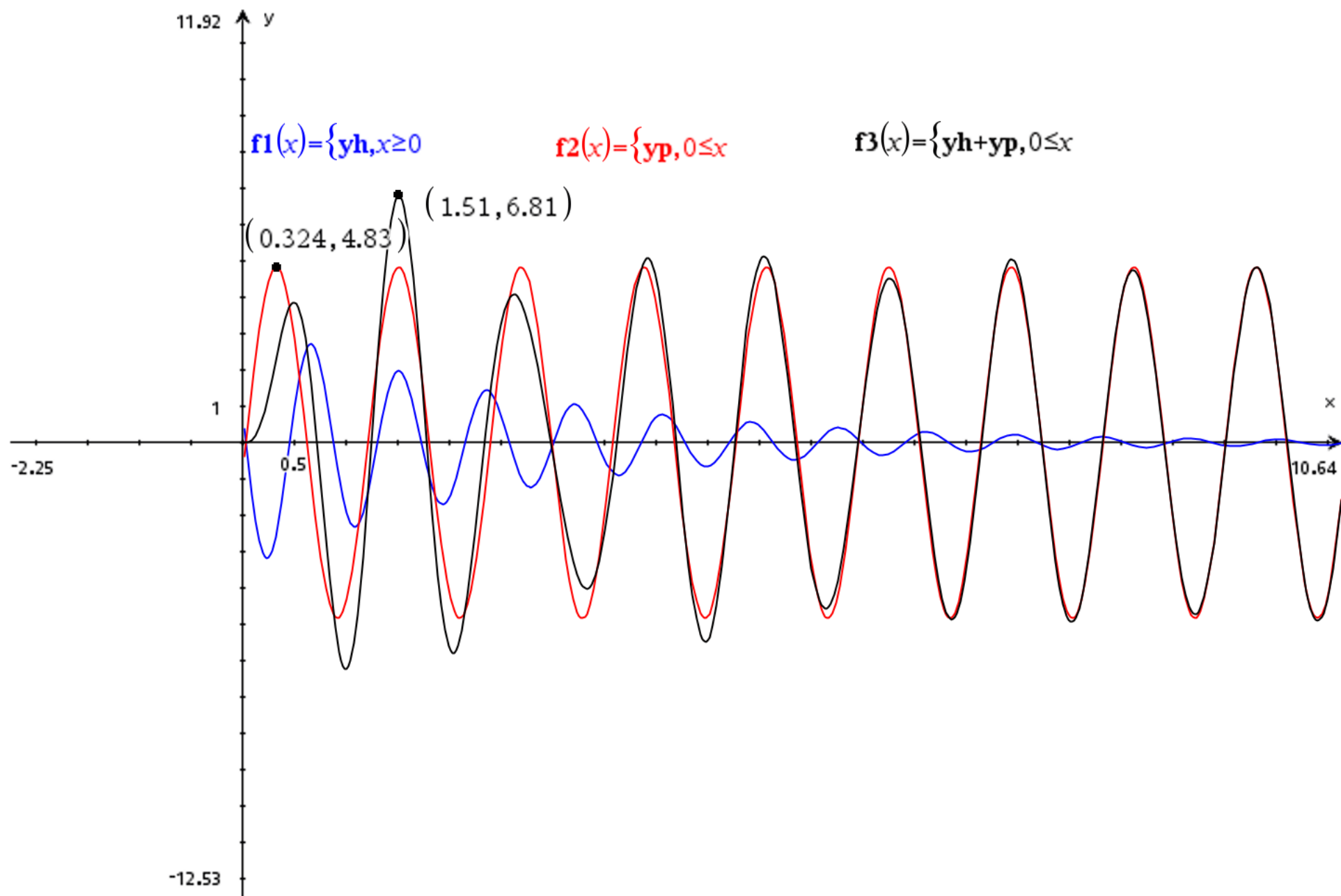
5.12991

k 379.259

$$\text{deSolve}(m \cdot yy'' + c \cdot yy' + k \cdot yy = 900 \cdot \sin(wd \cdot x) \text{ and } yy(0) = 0 \text{ and } yy'(0) = 0, x, yy)$$

$$yy = 0.704694 \cdot (0.690973)^x \cdot \cos(7.38385 \cdot x) - 3.39437 \cdot (0.690973)^x \cdot \sin(7.38385 \cdot x) + 3.17366 \cdot 10^{15} \cdot \left((\sin(0.1 \cdot x))^2 + 12.25 \right)$$

□



$$\frac{12 \cdot 200 \cdot 10^6 \cdot 4 \cdot 10^{-5}}{(4.5)^3} \cdot 2 \rightarrow k$$

1

2107.

$$\frac{15 \cdot 8}{9.8} \rightarrow m$$

12.2449

$$2 \cdot \sqrt{m \cdot k} \cdot 0.05 \rightarrow c$$

16.0624

$$\sqrt{\frac{k}{m}} \rightarrow \omega n$$

13.1176

$$\omega n \cdot \sqrt{1 - (0.05)^2} \rightarrow \omega d$$

13.1012

$$6 \rightarrow \omega 0$$

6.

$$\frac{\omega 0}{\omega n} \rightarrow r$$

0.457401

$$\frac{12}{k}$$

2.1

$$\frac{12}{k}$$

0.005695

$\frac{0.0056953125000002}{\sqrt{(1-r^2)^2 + (2 \cdot 0.05 \cdot r)^2}}$	0.00719
--	---------

-----2.2	2.2
----------	-----

$2 \cdot \pi \cdot \sqrt{\frac{m}{k}}$	0.478989
--	----------

-----3	3
--------	---

$\frac{k}{2} \cdot 0.0071900872852683$	7.57474
--	---------

$\frac{6 \cdot 200 \cdot 10^6 \cdot 4 \cdot 10^{-5} \cdot 0.0071900872852683}{(4.5)^2}$	17.0432
---	---------

$\frac{17.043169861377}{3.25 \cdot 10^5 \cdot 10^{-6}}$	52.4405
---	---------

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-----1

1

$$12.244897959184 \rightarrow m$$

$$12.2449$$

$$16.062362718315 \rightarrow c$$

$$16.0624$$

$$2106.9958847736 \rightarrow k$$

$$2107.$$

$$m \cdot y'' + c \cdot y' + k \cdot y - 12 \cdot \sin(6 \cdot t) \rightarrow y1$$

$$-12 \cdot \sin(6 \cdot t) + 12.2449 \cdot y'' + 16.0624 \cdot y' + 2107 \cdot y$$

$$c1 \cdot \sin(6 \cdot t) + c2 \cdot \cos(6 \cdot t) \rightarrow yp$$

$$c2 \cdot \cos(6 \cdot t) + c1 \cdot \sin(6 \cdot t)$$

-----2

2

$$m \cdot \frac{d^2}{dt^2}(yp) + c \cdot \frac{d}{dt}(yp) + k \cdot yp - 12 \cdot \sin(6 \cdot t)$$

$$(96.3742 \cdot c1 + 1666.18 \cdot c2) \cdot \cos(6 \cdot t) + (1666.18 \cdot c1 - 96.3742 \cdot c2 - 12) \cdot \sin(6 \cdot t)$$

$$\text{solve}\left(\begin{cases} 96.3742 \cdot c1 + 1666.18 \cdot c2 = 0 \\ 1666.18 \cdot c1 - 96.3742 \cdot c2 - 12 = 0 \end{cases}, \{c1, c2\}\right)$$

$$c1 = 0.007178 \text{ and } c2 = -0.000415$$

$$yp|c1=0.0071780877977116 \text{ and } c2=-4.1519071710993\text{E-}4$$

$$0.007178 \cdot \sin(6 \cdot t) - 0.000415 \cdot \cos(6 \cdot t)$$

-----3

3

$$yp|c1=0.0071780877977116 \text{ and } c2=-4.1519071710993\text{E-}4 \rightarrow yp2$$

$$0.007178 \cdot \sin(6 \cdot t) - 0.000415 \cdot \cos(6 \cdot t)$$

$$f_{\text{Max}}(y_{p2}, t) \quad t=0.523599 \cdot (n1-0.481609) \text{ and } \cos(3.14159 \cdot n1) < 0.$$

$$y_{p2}|_{t=0.523599 \cdot -0.481609} \quad -0.00719$$

$$\text{-----}4 \quad 4$$

$$\sqrt{\frac{k}{m}} \rightarrow \omega_n \quad 13.1176$$

$$\omega_n \cdot \sqrt{1-(0.05)^2} \rightarrow \omega_d \quad 13.1012$$

$$e^{-0.05 \cdot \omega_n \cdot t} \cdot (d1 \cdot \sin(\omega_d \cdot t) + d2 \cdot \cos(\omega_d \cdot t)) \rightarrow y_h \quad (0.518985)^t \cdot (d2 \cdot \cos(13.1012 \cdot t) + d1 \cdot \sin(13.1012 \cdot t))$$

$$y_h + y_{p2} \rightarrow y_{yy} \quad (0.518985)^t \cdot (d2 \cdot \cos(13.1012 \cdot t) + d1 \cdot \sin(13.1012 \cdot t) - 0.000415 \cdot (1.92684)^t \cdot (\cos(6 \cdot t) - 17.2887 \cdot \sin(6 \cdot t)))$$

$$y_{yy}=0|_{t=0} \quad d2-0.000415=0$$

$$\frac{d}{dt}(y_{yy})=0|_{t=0} \quad 13.1012 \cdot (d1-0.050063 \cdot (d2-0.065665))=0$$

$$\text{solve}\left(\left\{\begin{array}{l} d2-4.1519071710993\text{E-}4=0 \\ 13.10118896373 \cdot (d1-0.050062617432187 \cdot (d2-0.06566527291141))=0 \end{array}\right\}, \{d1, d2\}\right) \quad d1=-0.003267 \text{ and } d2=0.000415$$

yyy|d1=-0.003266589902312 and d2=4.1519071710993E-4→yyy1

$$0.000415 \cdot (0.518985)^t \cdot \left(\cos(13.1012 \cdot t) - 7.86769 \cdot \left(\sin(13.1012 \cdot t) + 0.127102 \cdot (1.92684)^t \cdot (\cos(6 \cdot t) - 17.2887 \cdot \sin(6 \cdot t)) \right) \right)$$

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