In[ ]:=
```
(*Exercício 01*)
(*Defining Variables and Functions*)
A
k
m
ϕ
ω = sqrt (k / m)
Clear[A, k, m, ϕ, ω]
(*Função Posição*)
x[t_] := A * Cos[(ω * t + ϕ)]
(*Função Velocidade*)
v[t_] := -ω * A * Sin[(ω * t + ϕ)]

(*Exercício 02*)
(*Setting Variables and Graph Plot*)
0 ≤ t ≤ 10
ϕ = N[Pi / 4]
A21 = Quantity[5, "Meters"]
k21 = Quantity[2, ("Newtons") / ("Meters")]
m21 = Quantity[1.75, "Kilograms"]
ω1 = N[((k21 / m21) ^ (1 / 2))]
subs21 = {A → N[A21], ϕ → N[ϕ] , ω → N[ω1]}

A22 = N[5]
k22 = N[2]
m22 = N[1.75]
ω2 = N[((k22 / m22) ^ (1 / 2))]
subs22 = {A → N[A22], ϕ → N[ϕ] , ω → N[ω2]}
Plot[x[t] /. subs21, {t, 0, 10}]
Plot[x[t] /. subs22, {t, 0, 10}]
Plot[v[t] /. subs21, {t, 0, 10}]
Plot[v[t] /. subs22, {t, 0, 10}]
```

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```
(*Exercício 03*)
(*Setting Variables and Graph Plot*)
  ajuste   variáveis        grafo   gráfico
x01 = Quantity[0.25, "Meters"]
      grandeza física
v01 = Quantity[1.25, ("Meters") / ("Seconds")]
      grandeza física
x02 = N[0.25]
      valor numérico
v01 = N[1.25]
      valor numérico
subsAϕ1 = {x0 → x01, v0 → v01, ω → N[ω1]}
                                  valor numérico
subsAϕ2 = {x0 → x02, v0 → v02, ω → N[ω2]}
                                  valor numérico
A = ((((x0)^2) + (((v0)^2) / ((ω)^(2))))^(1 / 2))
ϕ = ArcTan[((-v0) / ((ω) * (x0)))]
    arco tangente
A31 = A /. subsAϕ1
A32 = A /. subsAϕ2
ϕ31 = ϕ /. subsAϕ1
ϕ32 = ϕ /. subsAϕ2
subs31 = {A → N[A31], ϕ → N[ϕ31] , ω → N[ω1]}
              valor numérico  valor numérico  valor numéric
subs32 = {A → N[A32], ϕ → N[ϕ32] , ω → N[ω2]}
              valor numérico  valor numérico  valor numéric
Plot[x[t] /. subs31, {t, 0, 10}]
gráfico
Plot[x[t] /. subs32, {t, 0, 10}]
gráfico
Plot[v[t] /. subs31, {t, 0, 10}]
gráfico
Plot[v[t] /. subs32, {t, 0, 10}]
gráfico
```

Out[ ]= $\sqrt{x0^2 + \frac{v0^2}{\omega^2}}$

Out[ ]= k

Out[ ]= m

Out[ ]= $-\text{ArcTan}\left[\frac{v0}{x0\,\omega}\right]$

Out[ ]= $\frac{k\ \text{sqrt}}{m}$

Out[ ]= $0 \le t \le 10$

Out[ ]= 0.785398

Out[ ]= 5 m

Out[ ]= 2 N/m

Out[ ]= 1.75 kg

Out[ ]= $1.06904\ \sqrt{N}\ /\ (\sqrt{kg}\ \sqrt{m}\ )$

Out[ ]= $\left\{A \to 5.\ m\ ,\ 0.785398 \to 0.785398,\ \omega \to 1.06904\ \sqrt{N}\ /\ (\sqrt{kg}\ \sqrt{m}\ )\right\}$

Out[ ]= 5.

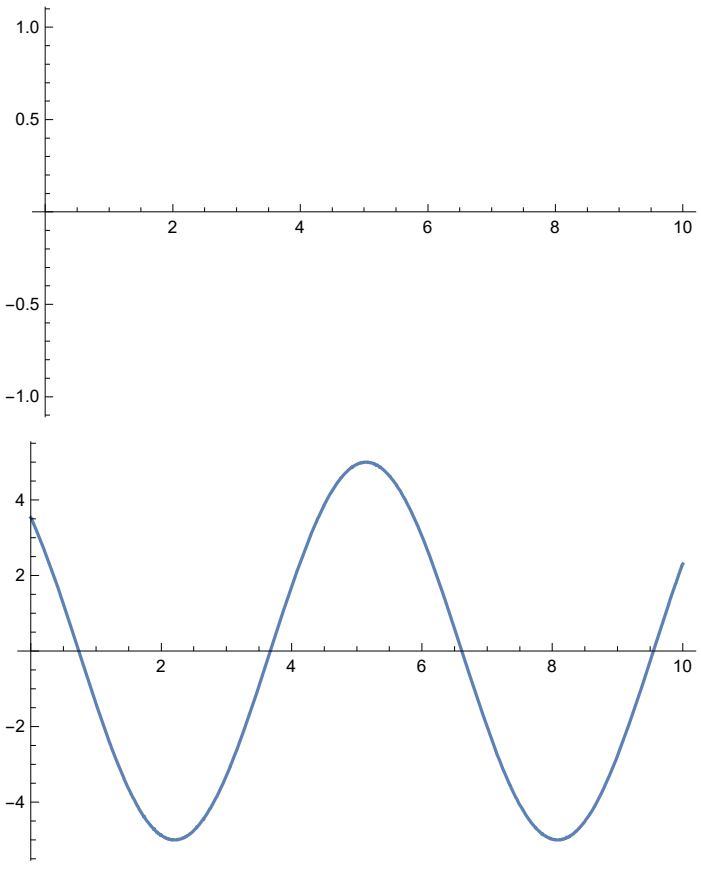
Out[ ]= 2.

Out[ ]= 1.75

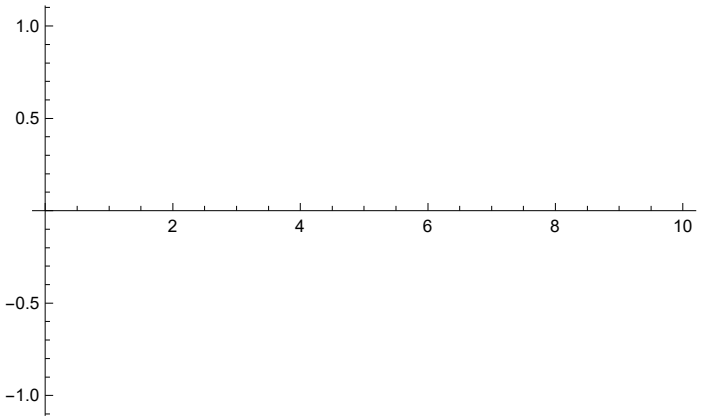
Out[ ]= 1.06904

Out[ ]= $\{A \to 5.,\ 0.785398 \to 0.785398,\ \omega \to 1.06904\}$

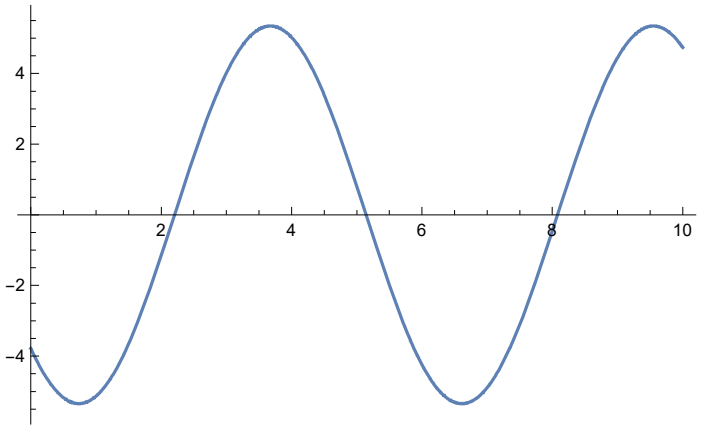
Out[ ]=



Out[ ]=



Out[ ]=



Out[ ]= $0.25\ \mathrm{m}$

Out[ ]= $1.25\ \mathrm{m/s}$

Out[ ]= 0.25

Out[ ]= 1.25

Out[ ]= $\left\{x0 \to 0.25\ \mathrm{m},\ v0 \to 1.25,\ \omega \to 1.06904\ \sqrt{\mathrm{N}}\ /\ (\sqrt{\mathrm{kg}}\ \sqrt{\mathrm{m}})\right\}$

Out[ ]= $\{x0 \to 0.25,\ v0 \to 0.25,\ \omega \to 1.06904\}$

Out[ ]= $\sqrt{x0^2 + \frac{v0^2}{\omega^2}}$

Out[ ]= $-\mathrm{ArcTan}\left[\frac{v0}{x0\,\omega}\right]$

Quantity: $\frac{\text{Kilograms Meters}}{\text{Newtons}}$ and Meters^2 are incompatible units

Quantity: $\frac{\text{Kilograms Meters}}{\text{Newtons}}$ and Meters^2 are incompatible units

Out[ ]= $\sqrt{0.0625\ \mathrm{m}^2 + 1.36719\ \mathrm{kg\,m/N}}$

Out[ ]= 0.342327

Out[ ]= $-\text{ArcTan}\left[4.67707\sqrt{\text{kg}}/\left(\sqrt{\text{m}}\sqrt{\text{N}}\right)\right]$

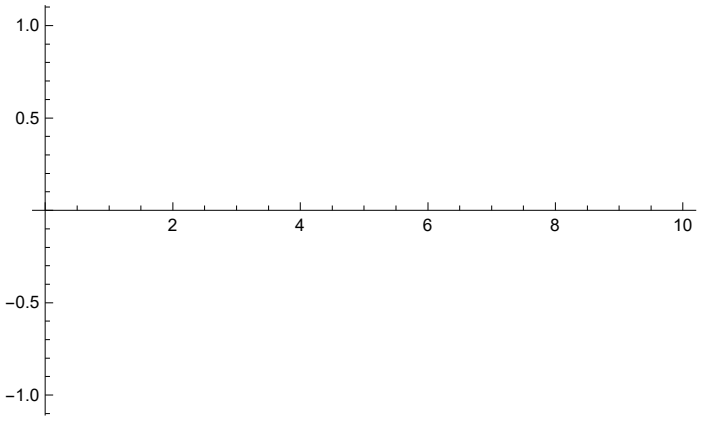
Out[ ]= -0.75204

Out[ ]= $\left\{\sqrt{\text{x0}^2+\frac{\text{v0}^2}{\omega^2}}\to\sqrt{0.0625\,\text{m}^2+1.36719\,\text{kg m/N}}\,,\right.$

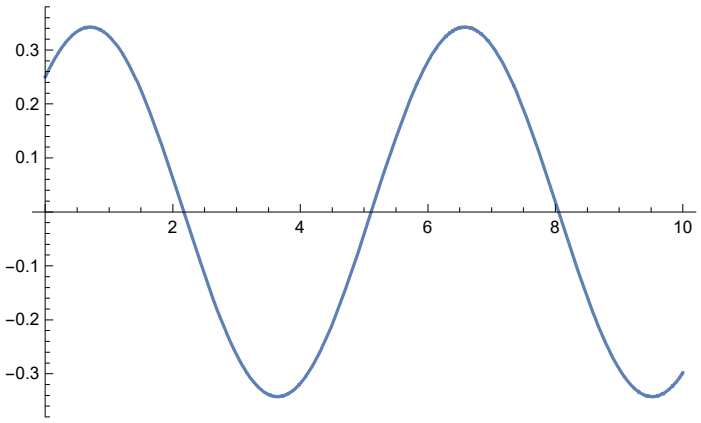
$\left.-\text{ArcTan}\left[\frac{\text{v0}}{\text{x0}\,\omega}\right]\to -1.\,\text{ArcTan}\left[4.67707\sqrt{\text{kg}}/\left(\sqrt{\text{m}}\sqrt{\text{N}}\right)\right],\ \omega\to 1.06904\sqrt{\text{N}}/\left(\sqrt{\text{kg}}\sqrt{\text{m}}\right)\right\}$

Out[ ]= $\left\{\sqrt{\text{x0}^2+\frac{\text{v0}^2}{\omega^2}}\to 0.342327,\ -\text{ArcTan}\left[\frac{\text{v0}}{\text{x0}\,\omega}\right]\to -0.75204,\ \omega\to 1.06904\right\}$

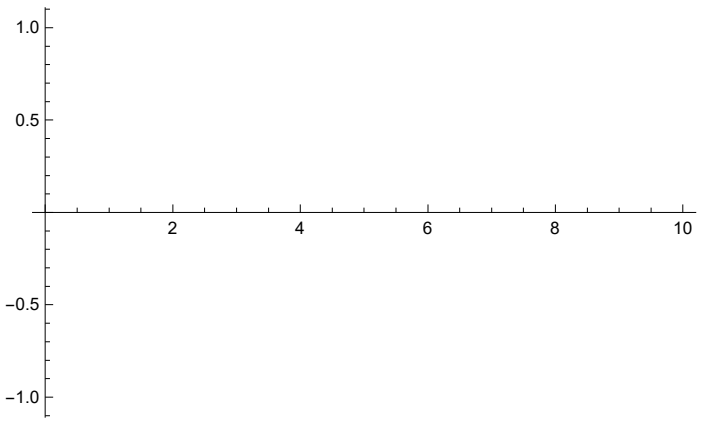
Out[ ]=



Out[ ]=



Out[ ]=



Out[ ]=