```
Clear[L, a, phi, theta, m, k, w, yp]
f[θ_] := a Cos[θ + ϕ] + Sqrt[L^2 - (yp - a Sin[θ + ϕ])^2]
f'[θ](*First derivative*)
f''[θ](*Second derivative*)
(*f[0], intial time , no time taking into account*)
deltax[θ_] := f[θ] - f[0]
(*Force of the Plancks*)
Fplanks[θ_] := -k * deltax[θ] (*where k is an arbitrary constant*)
Fplanks[θ]
Frodx[θ_] := m f''[θ] + Fplanks[θ]
Frodx[θ] // FullSimplify
```

Out[65]=

$$-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]+\frac{a\,\mathrm{Cos}\left[\frac{7\pi}{60}+\theta\right]\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)}{\sqrt{L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2}}$$

Out[66]=

$$-a\,\mathrm{Cos}\left[\frac{7\pi}{60}+\theta\right]-\frac{a^2\,\mathrm{Cos}\left[\frac{7\pi}{60}+\theta\right]^2\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2}{\left(L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2\right)^{3/2}}-\frac{a^2\,\mathrm{Cos}\left[\frac{7\pi}{60}+\theta\right]^2}{\sqrt{L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2}}-\frac{a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)}{\sqrt{L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2}}$$

Out[69]=

$$-k\left(-a\,\mathrm{Cos}\left[\frac{7\pi}{60}\right]+a\,\mathrm{Cos}\left[\frac{7\pi}{60}+\theta\right]-\sqrt{L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}\right]\right)^2}+\sqrt{L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2}\right)$$

Out[71]=

$Aborted

In[48]:=
```
Clear[L, a, phi, theta, m, k, w, yp]
xr[θ_] := a Cos[θ + ϕ]
Ftot = Frodx[θ] / ((f[θ] - xr[θ]) / L)
Ftot // FullSimplify
(*Setting values for the constants*)
{w = -5, L = 1, a = 0.02, k = 100 , yp = .3,
 m = 70, ϕ = 21 (Pi / 180)}
Plot[Ftot, {θ, 0, 2 Pi}]
```

Out[50]=

$$\left(L\left(m\left(-a\,\mathrm{Cos}\left[\frac{7\pi}{60}+\theta\right]-\frac{a^2\,\mathrm{Cos}\left[\frac{7\pi}{60}+\theta\right]^2\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2}{\left(L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2\right)^{3/2}}-\frac{a^2\,\mathrm{Cos}\left[\frac{7\pi}{60}+\theta\right]^2}{\sqrt{L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2}}-\frac{a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)}{\sqrt{L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2}}\right)-k\left(-a\,\mathrm{Cos}\left[\frac{7\pi}{60}\right]+a\,\mathrm{Cos}\left[\frac{7\pi}{60}+\theta\right]-\sqrt{L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}\right]\right)^2}+\sqrt{L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2}\right)\right)\right)\Big/\left(\sqrt{L^2-\left(yp-a\,\mathrm{Sin}\left[\frac{7\pi}{60}+\theta\right]\right)^2}\right)$$

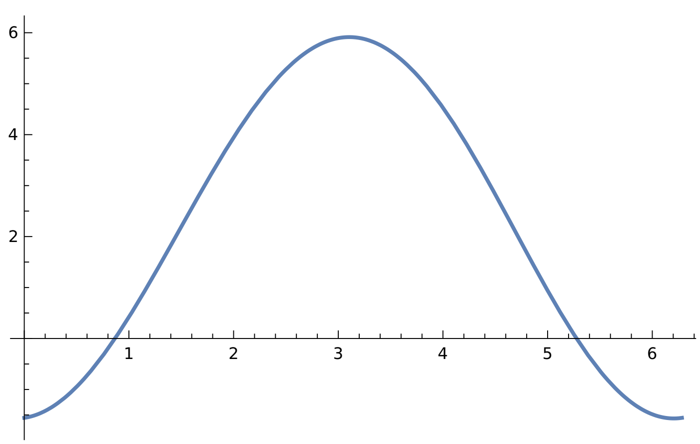
Out[51]=

$Aborted

Out[52]=

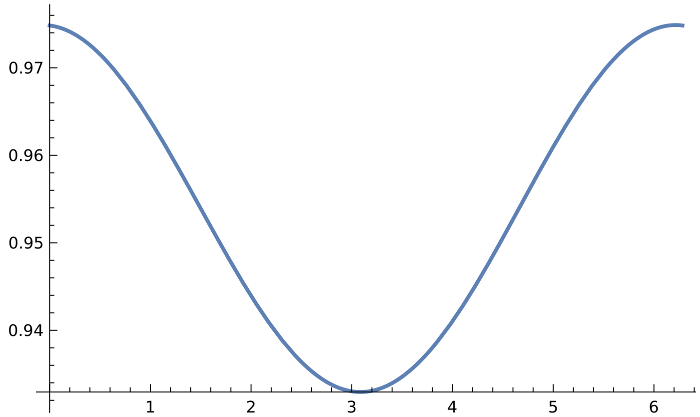
$$\left\{-5,\ 1,\ 0.02,\ 100,\ 0.3,\ 70,\ \frac{7\pi}{60}\right\}$$

Out[53]=



In[15]:=
```
Plot[f[θ], {θ, 0, 2 Pi}]
```

Out[15]=



In[72]:=

```
(*Expresion for the total force copied from 'try 2'*)
Clear[L, a, phi, theta, m, k, w, yp]
ftot = (L (a m w^2 (-Cos[phi + theta] - (a L^2 Cos[phi + theta]^2)/(L^2 - (yp - a Sin[phi + theta])^2)^(3/2) + (Sin[phi + theta] (-yp + a Sin[phi + theta]))/Sqrt[L^2 - (yp - a Sin[phi + theta])^2]) + k (a Cos[phi] - a Cos[phi + theta] + Sqrt[L^2 - (yp - a Sin[phi])^2] - Sqrt[L^2 - (yp - a Sin[phi + theta])^2])))/(Sqrt[L^2 - (yp - a Sin[phi + theta])^2])
(*Expresion for xp*)
xp = a Cos[theta + phi] + Sqrt[L ^ 2 - (yp - a Sin[theta + phi]) ^ 2]
```

Out[73]=

$$\left(L\left(a\,m\,w^2\left(-\mathrm{Cos}[\mathrm{phi}+\mathrm{theta}]-\frac{a\,L^2\,\mathrm{Cos}[\mathrm{phi}+\mathrm{theta}]^2}{\left(L^2-\left(\mathrm{yp}-a\,\mathrm{Sin}[\mathrm{phi}+\mathrm{theta}]\right)^2\right)^{3/2}}+\frac{\mathrm{Sin}[\mathrm{phi}+\mathrm{theta}]\left(-\mathrm{yp}+a\,\mathrm{Sin}[\mathrm{phi}+\mathrm{theta}]\right)}{\sqrt{L^2-\left(\mathrm{yp}-a\,\mathrm{Sin}[\mathrm{phi}+\mathrm{theta}]\right)^2}}\right)+k\left(a\,\mathrm{Cos}[\mathrm{phi}]-a\,\mathrm{Cos}[\mathrm{phi}+\mathrm{theta}]+\sqrt{L^2-\left(\mathrm{yp}-a\,\mathrm{Sin}[\mathrm{phi}]\right)^2}-\sqrt{L^2-\left(\mathrm{yp}-a\,\mathrm{Sin}[\mathrm{phi}+\mathrm{theta}]\right)^2}\right)\right)\right)\Big/\left(\sqrt{L^2-\left(\mathrm{yp}-a\,\mathrm{Sin}[\mathrm{phi}+\mathrm{theta}]\right)^2}\right)$$

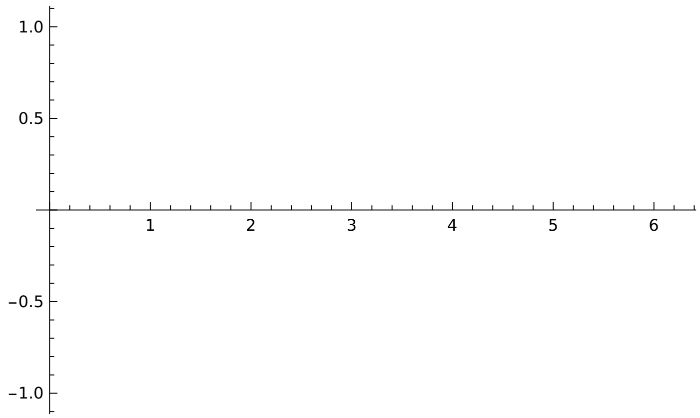
Out[74]=

$$a\,\mathrm{Cos}[\mathrm{phi}+\mathrm{theta}]+\sqrt{L^2-\left(\mathrm{yp}-a\,\mathrm{Sin}[\mathrm{phi}+\mathrm{theta}]\right)^2}$$

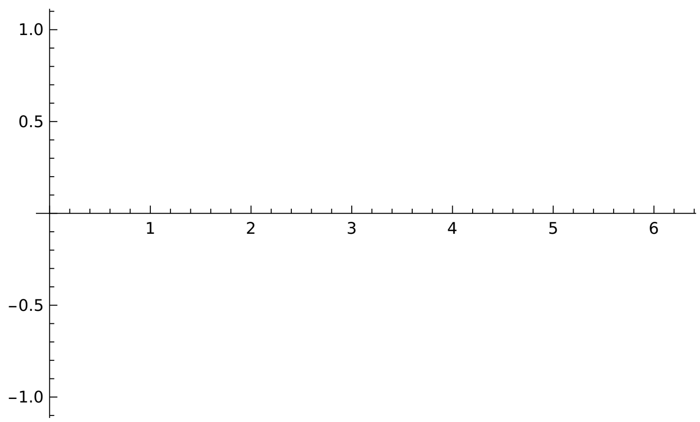
In[1]:=
```
{w2 = -5, L = 1, a = 0.02, k = 100, yp = .3 + 0.05 Sin[w2 * theta], m = 70, phi = 20 (Pi / 180)}
Plot[ftot, {theta, 0, 2 Pi}](*Plotting the total force over theta*)
Plot[xp, {theta, 0, 2 Pi}] (*Plotting xp over theta*)
```

Out[1]= $\{-5, 1, 0.02, 100, 0.3 - 0.05\,\mathrm{Sin}[5\,\mathrm{theta}], 70, \frac{\pi}{9}\}$

Out[2]=



Out[3]=



In[154]:=

```
Clear[L, a, phi, theta, m, k, w, yp]
f[theta_] := a Cos[theta + phi] + Sqrt[L ^ 2 - (yp - a Sin[theta + phi]) ^ 2]
f'[theta](*First derivative*)
f''[theta](*Second derivative*)
(*f[0], intial time , no time taking into account*)
deltax[theta_] := f[theta] - f[0]
(*Force of the Plancks*)
Fplanks[theta_] := -k * deltax[theta] (*where k is an arbitrary constant*)
Fplanks[theta]

Fx[theta_] := m f''[theta] + Fplanks[theta]
Fx[theta] // FullSimplify
{w2 = -5, L = 1, a = 0.02, k = 100, yp = .3 + 0.05 Sin[w2 * theta], m = 70, phi = 20 (Pi / 180)}
Plot[Fx[theta], {theta, 0, 2 Pi}](*Plotting the total force over theta*)
```

Out[156]=

$$-a\,\mathrm{Sin}[phi + theta] + \frac{a\,\mathrm{Cos}[phi + theta]\,(yp - a\,\mathrm{Sin}[phi + theta])}{\sqrt{L^2 - (yp - a\,\mathrm{Sin}[phi + theta])^2}}$$

Out[157]=

$$-a\,\mathrm{Cos}[phi + theta] - \frac{a^2\,\mathrm{Cos}[phi + theta]^2\,(yp - a\,\mathrm{Sin}[phi + theta])^2}{\left(L^2 - (yp - a\,\mathrm{Sin}[phi + theta])^2\right)^{3/2}} - \frac{a^2\,\mathrm{Cos}[phi + theta]^2}{\sqrt{L^2 - (yp - a\,\mathrm{Sin}[phi + theta])^2}} - \frac{a\,\mathrm{Sin}[phi + theta]\,(yp - a\,\mathrm{Sin}[phi + theta])}{\sqrt{L^2 - (yp - a\,\mathrm{Sin}[phi + theta])^2}}$$

Out[160]=

$$-k\left(-a\,\mathrm{Cos}[phi] + a\,\mathrm{Cos}[phi + theta] - \sqrt{L^2 - (yp - a\,\mathrm{Sin}[phi])^2} + \sqrt{L^2 - (yp - a\,\mathrm{Sin}[phi + theta])^2}\right)$$

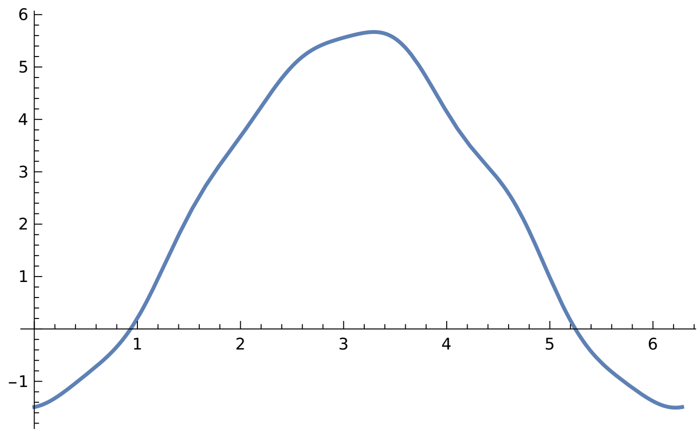
Out[162]=

$$a\,m\left(-\mathrm{Cos}[phi + theta] - \frac{a\,L^2\,\mathrm{Cos}[phi + theta]^2}{\left(L^2 - (yp - a\,\mathrm{Sin}[phi + theta])^2\right)^{3/2}} + \frac{\mathrm{Sin}[phi + theta]\,(-yp + a\,\mathrm{Sin}[phi + theta])}{\sqrt{L^2 - (yp - a\,\mathrm{Sin}[phi + theta])^2}}\right) + k\left(a\,\mathrm{Cos}[phi] - a\,\mathrm{Cos}[phi + theta] + \sqrt{L^2 - (yp - a\,\mathrm{Sin}[phi])^2} - \sqrt{L^2 - (yp - a\,\mathrm{Sin}[phi + theta])^2}\right)$$

Out[163]=

$$\left\{-5,\ 1,\ 0.02,\ 100,\ 0.3 - 0.05\,\mathrm{Sin}[5\,theta],\ 70,\ \frac{\pi}{9}\right\}$$

Out[164]=



In[282]:=

```
Clear[L, a, phi, theta, m, k, w, yp]
(*Solving for Fy*)
```

$$\text{ftot} = \left(L\left(a\,m\,w^2\left(-\text{Cos}[\text{phi}+\text{theta}] - \frac{a\,L^2\,\text{Cos}[\text{phi}+\text{theta}]^2}{\left(L^2-(\text{yp}-a\,\text{Sin}[\text{phi}+\text{theta}])^2\right)^{3/2}} + \frac{\text{Sin}[\text{phi}+\text{theta}]\,(-\text{yp}+a\,\text{Sin}[\text{phi}+\text{theta}])}{\sqrt{L^2-(\text{yp}-a\,\text{Sin}[\text{phi}+\text{theta}])^2}}\right) + k\left(a\,\text{Cos}[\text{phi}] - a\,\text{Cos}[\text{phi}+\text{theta}] + \sqrt{L^2-(\text{yp}-a\,\text{Sin}[\text{phi}])^2} - \sqrt{L^2-(\text{yp}-a\,\text{Sin}[\text{phi}+\text{theta}])^2}\right)\right)\right) \Big/ \left(\sqrt{L^2-(\text{yp}-a\,\text{Sin}[\text{phi}+\text{theta}])^2}\right)$$

```
(*Finding the torque*)
{w = -5, w2 = -5, L = 1, a = 0.02, k = 100,
 yp = .3 + 0.0 Sin[w2 * theta], m = 70, phi = 0 (Pi / 180)}
x = a Cos[theta + phi]
y = a Sin[theta + phi]
Fy = ftot * ((yp - y) / L)
torque = Fx[theta] * y + Fy * x
Plot[-Fx[theta] * y - Fy * x, {theta, 0, Pi}](*Plotting the total force over theta*)
Plot[-Fx[theta] * y + Fy * x, {theta, Pi, 2 Pi}]
```

Out[283]=

$$\left(L\left(a\,m\,w^2\left(-\text{Cos}[\text{phi}+\text{theta}]-\frac{a\,L^2\,\text{Cos}[\text{phi}+\text{theta}]^2}{\left(L^2-(\text{yp}-a\,\text{Sin}[\text{phi}+\text{theta}])^2\right)^{3/2}}+\frac{\text{Sin}[\text{phi}+\text{theta}]\,(-\text{yp}+a\,\text{Sin}[\text{phi}+\text{theta}])}{\sqrt{L^2-(\text{yp}-a\,\text{Sin}[\text{phi}+\text{theta}])^2}}\right)+k\left(a\,\text{Cos}[\text{phi}]-a\,\text{Cos}[\text{phi}+\text{theta}]+\sqrt{L^2-(\text{yp}-a\,\text{Sin}[\text{phi}])^2}-\sqrt{L^2-(\text{yp}-a\,\text{Sin}[\text{phi}+\text{theta}])^2}\right)\right)\right)\Big/\left(\sqrt{L^2-(\text{yp}-a\,\text{Sin}[\text{phi}+\text{theta}])^2}\right)$$

Out[284]=

{-5, -5, 1, 0.02, 100, 0.3, 70, 0}

Out[285]=

0.02 Cos[theta]

Out[286]=

0.02 Sin[theta]

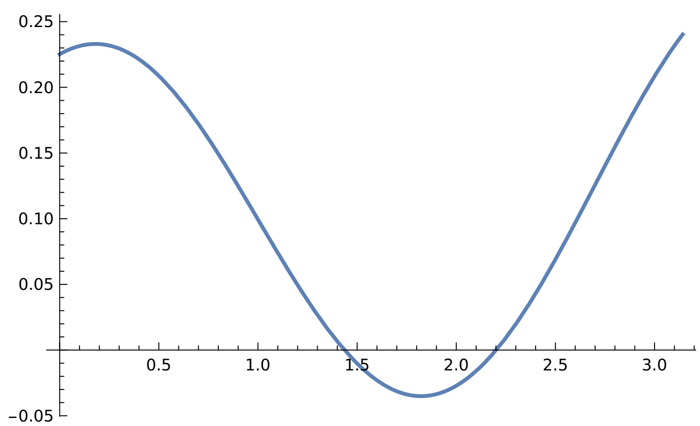
Out[287]=

$$\left((0.3-0.02\,\text{Sin}[\text{theta}])\left(100\left(0.973939-0.02\,\text{Cos}[\text{theta}]-\sqrt{1-(0.3-0.02\,\text{Sin}[\text{theta}])^2}\right)+35.\left(-\text{Cos}[\text{theta}]-\frac{0.02\,\text{Cos}[\text{theta}]^2}{\left(1-(0.3-0.02\,\text{Sin}[\text{theta}])^2\right)^{3/2}}+\frac{(-0.3+0.02\,\text{Sin}[\text{theta}])\,\text{Sin}[\text{theta}]}{\sqrt{1-(0.3-0.02\,\text{Sin}[\text{theta}])^2}}\right)\right)\right)\Big/\left(\sqrt{1-(0.3-0.02\,\text{Sin}[\text{theta}])^2}\right)$$

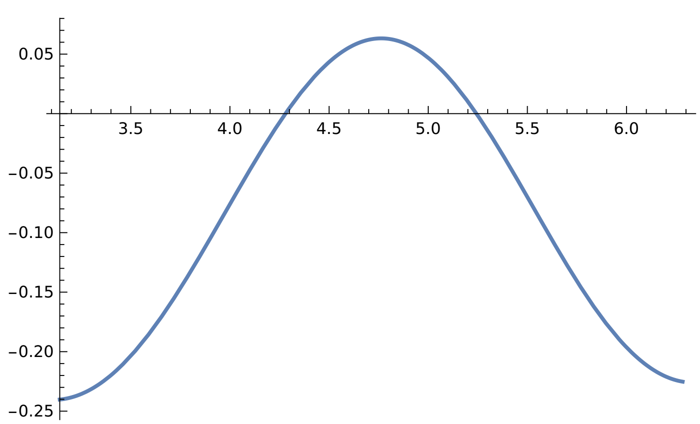
Out[288]=

$$0.02\,\mathrm{Sin[theta]}\left(100\left(0.973939-0.02\,\mathrm{Cos[theta]}-\sqrt{1-\left(0.3-0.02\,\mathrm{Sin[theta]}\right)^2}\right)+1.4\left(-\mathrm{Cos[theta]}-\frac{0.02\,\mathrm{Cos[theta]}^2}{\left(1-\left(0.3-0.02\,\mathrm{Sin[theta]}\right)^2\right)^{3/2}}+\frac{\left(-0.3+0.02\,\mathrm{Sin[theta]}\right)\mathrm{Sin[theta]}}{\sqrt{1-\left(0.3-0.02\,\mathrm{Sin[theta]}\right)^2}}\right)\right)+\left(0.02\,\mathrm{Cos[theta]}\left(0.3-0.02\,\mathrm{Sin[theta]}\right)\left(100\left(0.973939-0.02\,\mathrm{Cos[theta]}-\sqrt{1-\left(0.3-0.02\,\mathrm{Sin[theta]}\right)^2}\right)+35.\left(-\mathrm{Cos[theta]}-\frac{0.02\,\mathrm{Cos[theta]}^2}{\left(1-\left(0.3-0.02\,\mathrm{Sin[theta]}\right)^2\right)^{3/2}}+\frac{\left(-0.3+0.02\,\mathrm{Sin[theta]}\right)\mathrm{Sin[theta]}}{\sqrt{1-\left(0.3-0.02\,\mathrm{Sin[theta]}\right)^2}}\right)\right)\right)\Big/\left(\sqrt{1-\left(0.3-0.02\,\mathrm{Sin[theta]}\right)^2}\right)$$

Out[289]=



Out[290]=



```
(*Going back for "t"*)
Clear[L, a, ϕ, t, m, k, w, w2, yp]
f[t_] := a Cos[w t + ϕ] + Sqrt[L^2 - (yp - a Sin[w t + ϕ])^2]
(*Solve for the first and second derivative for xp*)
f'[t] (*First derivative*)
f''[t] (*Second derivative*)
delta[t_] = f[t] - f[0]
Fplanks[t_] := -k * delta[t]
Fx[t_] := m f''[t] + Fplanks[t]
Fx[t] // FullSimplify
xr[t_] := a Cos[w t + ϕ]
yr [t_] := a Sin[w t + ϕ]
Ftot = Fx[t] / ((f[t] - xr[t]) / L)
Fy = Ftot * ((yp - yr[t]) / L)
torque = Fx[t] * yr[t] + Fy * xr[t]
(*Give values for the variables*)
{w = 5, L = 1, a = 0.02, k = 100, yp = 0.2, m = 70, ϕ = 21 (Pi / 180)}
Plot[-Fx[t] * yr[t] - Fy * xr[t], {t, 0, Pi}, Axes → True, AxesLabel → {t, Torque}]
(*Plotting the torque over time*)
Plot[-Fx[t] * yr[t] + Fy * xr[t], {t, Pi, 2 Pi}, Axes → True, AxesLabel → {t, Torque}]
```

Out[151]=

$$-a\,\text{Cos}[\phi] + a\,\text{Cos}[t\,w+\phi] - \sqrt{L^2-(yp-a\,\text{Sin}[\phi])^2} + \sqrt{L^2-(yp-a\,\text{Sin}[t\,w+\phi])^2}$$

Out[154]=

$$a\,m\,w^2\left(-\text{Cos}[t\,w+\phi] - \frac{a\,L^2\,\text{Cos}[t\,w+\phi]^2}{\left(L^2-(yp-a\,\text{Sin}[t\,w+\phi])^2\right)^{3/2}} + \frac{\text{Sin}[t\,w+\phi]\,(-yp+a\,\text{Sin}[t\,w+\phi])}{\sqrt{L^2-(yp-a\,\text{Sin}[t\,w+\phi])^2}}\right) + k\left(a\,\text{Cos}[\phi] - a\,\text{Cos}[t\,w+\phi] + \sqrt{L^2-(yp-a\,\text{Sin}[\phi])^2} - \sqrt{L^2-(yp-a\,\text{Sin}[t\,w+\phi])^2}\right)$$

Out[157]=

$$\left(L\left(m\left(-a\,w^2\,\text{Cos}[t\,w+\phi] - \frac{a^2\,w^2\,\text{Cos}[t\,w+\phi]^2\,(yp-a\,\text{Sin}[t\,w+\phi])^2}{\left(L^2-(yp-a\,\text{Sin}[t\,w+\phi])^2\right)^{3/2}} - \frac{a^2\,w^2\,\text{Cos}[t\,w+\phi]^2}{\sqrt{L^2-(yp-a\,\text{Sin}[t\,w+\phi])^2}} - \frac{a\,w^2\,\text{Sin}[t\,w+\phi]\,(yp-a\,\text{Sin}[t\,w+\phi])}{\sqrt{L^2-(yp-a\,\text{Sin}[t\,w+\phi])^2}}\right) - k\left(-a\,\text{Cos}[\phi] + a\,\text{Cos}[t\,w+\phi] - \sqrt{L^2-(yp-a\,\text{Sin}[\phi])^2} + \sqrt{L^2-(yp-a\,\text{Sin}[t\,w+\phi])^2}\right)\right)\right) \Big/ \left(\sqrt{L^2-(yp-a\,\text{Sin}[t\,w+\phi])^2}\right)$$

Out[158]=

$$\left((yp - a\,\mathrm{Sin}[t\,w + \phi])\left(m\left(-a\,w^2\,\mathrm{Cos}[t\,w+\phi] - \frac{a^2\,w^2\,\mathrm{Cos}[t\,w+\phi]^2\,(yp - a\,\mathrm{Sin}[t\,w+\phi])^2}{\left(L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2\right)^{3/2}} - \frac{a^2\,w^2\,\mathrm{Cos}[t\,w+\phi]^2}{\sqrt{L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2}} - \frac{a\,w^2\,\mathrm{Sin}[t\,w+\phi]\,(yp - a\,\mathrm{Sin}[t\,w+\phi])}{\sqrt{L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2}}\right) - k\left(-a\,\mathrm{Cos}[\phi] + a\,\mathrm{Cos}[t\,w+\phi] - \sqrt{L^2 - (yp - a\,\mathrm{Sin}[\phi])^2} + \sqrt{L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2}\right)\right)\right) \Big/ \left(\sqrt{L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2}\right)$$

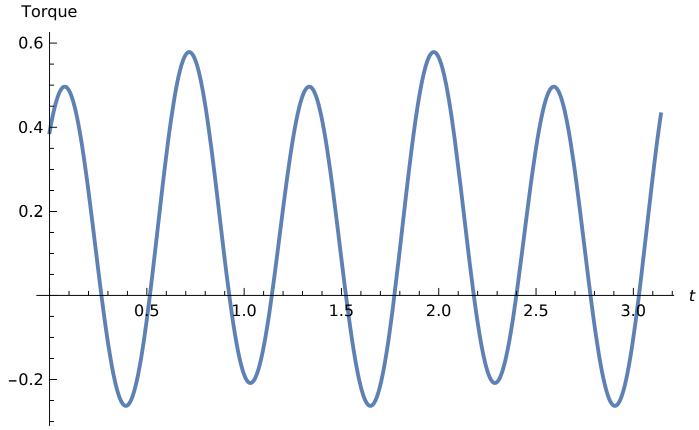
Out[159]=

$$a\,\mathrm{Sin}[t\,w+\phi]\left(m\left(-a\,w^2\,\mathrm{Cos}[t\,w+\phi] - \frac{a^2\,w^2\,\mathrm{Cos}[t\,w+\phi]^2\,(yp - a\,\mathrm{Sin}[t\,w+\phi])^2}{\left(L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2\right)^{3/2}} - \frac{a^2\,w^2\,\mathrm{Cos}[t\,w+\phi]^2}{\sqrt{L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2}} - \frac{a\,w^2\,\mathrm{Sin}[t\,w+\phi]\,(yp - a\,\mathrm{Sin}[t\,w+\phi])}{\sqrt{L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2}}\right) - k\left(-a\,\mathrm{Cos}[\phi] + a\,\mathrm{Cos}[t\,w+\phi] - \sqrt{L^2 - (yp - a\,\mathrm{Sin}[\phi])^2} + \sqrt{L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2}\right)\right) + \left(a\,\mathrm{Cos}[t\,w+\phi]\,(yp - a\,\mathrm{Sin}[t\,w+\phi])\left(m\left(-a\,w^2\,\mathrm{Cos}[t\,w+\phi] - \frac{a^2\,w^2\,\mathrm{Cos}[t\,w+\phi]^2\,(yp - a\,\mathrm{Sin}[t\,w+\phi])^2}{\left(L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2\right)^{3/2}} - \frac{a^2\,w^2\,\mathrm{Cos}[t\,w+\phi]^2}{\sqrt{L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2}} - \frac{a\,w^2\,\mathrm{Sin}[t\,w+\phi]\,(yp - a\,\mathrm{Sin}[t\,w+\phi])}{\sqrt{L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2}}\right) - k\left(-a\,\mathrm{Cos}[\phi] + a\,\mathrm{Cos}[t\,w+\phi] - \sqrt{L^2 - (yp - a\,\mathrm{Sin}[\phi])^2} + \sqrt{L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2}\right)\right)\right) \Big/ \left(\sqrt{L^2 - (yp - a\,\mathrm{Sin}[t\,w+\phi])^2}\right)$$

Out[160]=

$$\left\{5, 1, 0.02, 100, 0.2, 70, \frac{7\,\pi}{60}\right\}$$

Out[161]=



Out[162]=