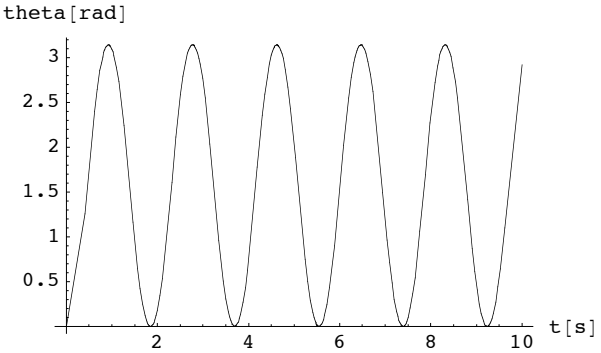
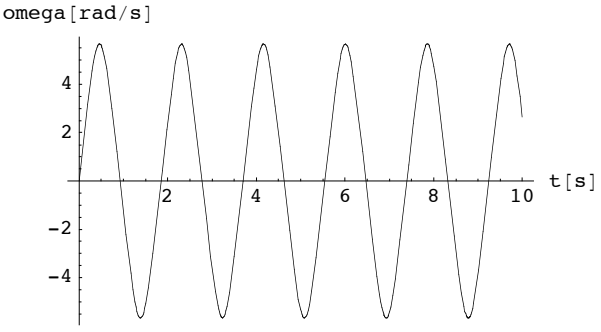
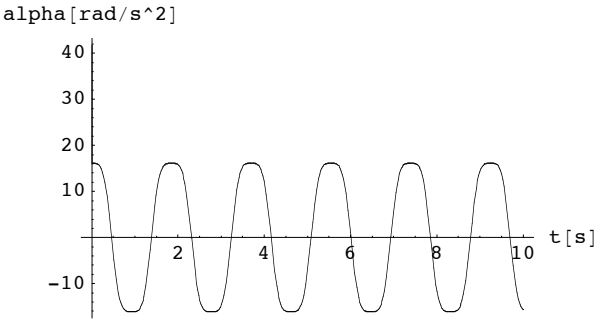
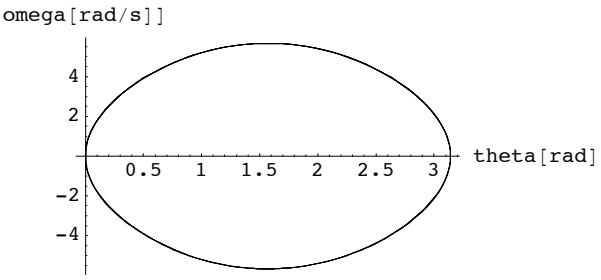
```
Apply[Clear, Names["Global`*"]];
Off[General::spell];
Off[General::spell1];

m = 12 / 32.2;
L = 3;
g = 32.2;
tf = 10;

eom = theta''[t] == 3 g Cos[theta[t]] / (2 L);
sol = NDSolve[{eom, theta[0] == 0, theta'[0] == 0}, theta[t], {t, 0, tf}];

Plot[Evaluate[theta[t] /. sol], {t, 0, tf}, AxesLabel → {"t[s]", "theta[rad]"}];
Plot[Evaluate[D[theta[t] /. sol, t]], {t, 0, tf}, AxesLabel → {"t[s]", "omega[rad/s]"}];
Plot[Evaluate[D[theta[t] /. sol, {t, 2}]],
  {t, 0, tf}, AxesLabel → {"t[s]", "alpha[rad/s^2]"}];

(*another way of solving the eom*)
sys = {x1'[t] == x2[t], x2'[t] == 3 g Cos[x1[t]] / (2 L)};
x0 = {x1[0] == 0, x2[0] == 0};
solution = NDSolve[{sys, x0}, {x1, x2}, {t, 0, tf}];
ParametricPlot[Evaluate[{x1[t], x2[t]} /. solution],
  {t, 0, tf}, AxesLabel → {"theta[rad]", "omega[rad/s]]"}];
```






alpha[rad/s^2]
40
30
20
10
-10
2
4
6
8
10
t[s]


omega[rad/s]]
4
2
-2
-4
0.5
1
1.5
2
2.5
3
theta[rad]