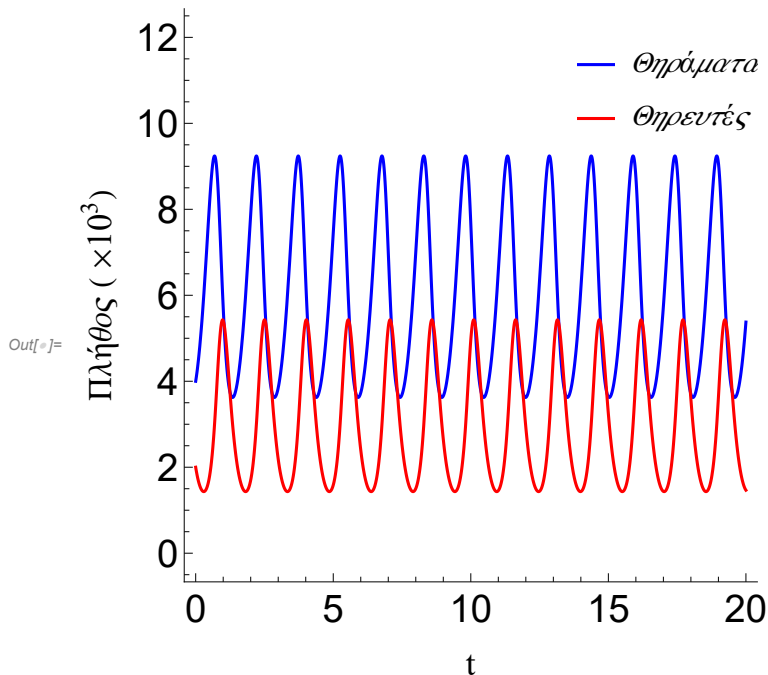


(* Μοντέλο Lotka-Volterra (θηρευτών-θηραμάτων) *)

```
a = 3;  
b = 1;  
c = 6;  
d = 1;  
tend = 20;  
x0 = 4; y0 = 2;  
x = .;  
y = .;
```

```
In[ ]:= Sol = NDSolve[{D[x[t], t] == a * x[t] - b * x[t] * y[t],  
  D[y[t], t] == -c * y[t] + d * x[t] * y[t], x[0] == x0, y[0] == y0}, {x, y}, {t, 0, tend}];  
Plot1 = Plot[Evaluate[x[t] /. First[Sol]], {t, 0, tend}, PlotPoints -> 200,  
  Mesh -> False, AxesLabel -> {t, x}, PlotRange -> All, PlotStyle -> Blue,  
  FrameLabel -> {Style["t", FontFamily -> "MS Serif", FontSize -> 18],  
  Style["Πλήθος ( ×103)", FontFamily -> "MS Serif", FontSize -> 18]},  
  RotateLabel -> True, Frame -> {{Automatic, False}, {Automatic, False}}];  
Plot2 = Plot[Evaluate[y[t] /. First[Sol]], {t, 0, tend}, PlotPoints -> 200,  
  Mesh -> False, AxesLabel -> {t, y}, PlotRange -> All, PlotStyle -> Red];
```

```
In[ ]:= Show[Plot1, Plot2, PlotRange -> {{0, tend}, {0, 12}},  
  Epilog -> Inset[Column[{LineLegend[{Blue, Red}, {"Θηράματα", "Θηρευτές"},  
  LabelStyle -> {FontFamily -> "Times New Roman", FontSize -> 16, FontSlant -> Italic}]}],  
  Scaled[{0.85, 0.85}]], MaxRecursion -> 0, PlotPoints -> {200, 100},  
  AspectRatio -> 1, AxesOrigin -> {0, 0}, RotateLabel -> True,  
  LabelStyle -> {20, GrayLevel[0]}]
```



```

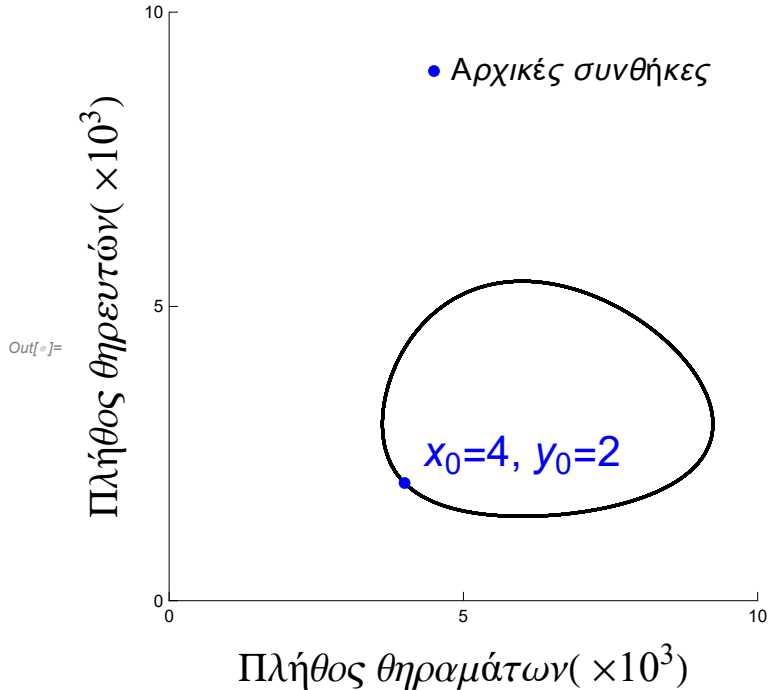
In[ ]:= Sol1 = NDSolve[{D[x[t], t] == a * x[t] - b * x[t] * y[t],
  D[y[t], t] == -c * y[t] + d * x[t] * y[t], x[0] == x0, y[0] == y0}, {x, y}, {t, 0, tend}];

In[ ]:= P1 = ParametricPlot[{Evaluate[x[t] /. First[Sol1]], Evaluate[y[t] /. First[Sol1]]},
  {t, 0, tend}, PlotPoints -> 200, Mesh -> False, PlotRange -> {{0, 10}, {0, 10}}, PlotStyle ->
  Black, FrameLabel -> {Style["Πλήθος θηραμάτων ( ×103)", FontFamily -> "MS Serif",
  FontSize -> 22, FontColor -> Black], Style["Πλήθος θηρευτών ( ×103)",
  FontFamily -> "MS Serif", FontSize -> 22, FontColor -> Black]},
  RotateLabel -> True, Frame -> {{Automatic, False}, {Automatic, False}},
  FrameTicks -> {{0, 5, 10, 15, 20, 25, 30}, None}, {{0, 5, 10, 15, 20, 25}, None}},
  Epilog -> {Inset[Graphics[{Black, Text[Style["Αρχικές συνθήκες", 16]]}], {7, 9}],
  Inset[Graphics[{Blue, Text[Style["x0=4, y0=2", 22]]}], {6, 2.5}]}];

G0 = Graphics[{PointSize[0.02], Blue, Point[{4.5, 9}]}];
G1 = Graphics[{PointSize[0.02], Blue, Point[{4, 2}]}];

In[ ]:= Show[P1, G0, G1]

```



```
In[ ]:= (*Phase plane *)  
StreamPlot[{a * x - b * x * y, -c * y + d * x * y},  
{x, 0, 15}, {y, 0, 10}, StreamPoints -> 2000, StreamScale -> Full]
```

