

# Analisi nello spazio delle configurazioni

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```
In[1]:= SetOptions[
  {
    Plot
  },
  TicksStyle -> Directive[
    Hue[5 / 6],
    6
  ]
];

In[2]:= ricorsione[g_, x1_, ini_, length_, xmin_, xmax_] := Block[
  {
    (*dichiaro le variabili locali*)
    start,
    orbit,
    plot,
    lines
  },
  (*definisco le variabili locali in funzione delle variabili di
input*)
  (*la variabile start definisce il punto iniziale che verrà mostrato \
in output. Ponendo ini=0,
  si ottiene start=0 e quindi viene mostrata l'orbita completa a partire da x1 e non \
dal punto iniziale*)
  start = Nest[g, N[x1], ini];
  (*questa variabile definisce la parte rimanente dell'orbita,
  cioè da start a length*)
  orbit = NestList[g, start, length];
  (*questa variabile è il grafico della funzione di trasferimento del \
sistema*)
  plot = Plot[
    g[x],
    {x, xmin, xmax},
    PlotStyle -> Thickness[0.003],
    DisplayFunction -> Identity
  ];
  (*la variabile locale orbit restituisce una lista di punti che \
bisogna trasformare in coppie ordinate appartenenti rispettivamente \
al grafico di f e alla semibisettrice del primo quadrante*)
  lines = {
    Red, Thickness[0.001],
    Line[Rest[Partition[Flatten[Transpose[{orbit, orbit}]], 2, 1]]]
  ];
  (*mostriamo in output il grafico di f e l'ente geometrico "lines"*)

  Show[plot, Graphics[
    {
      {
        Thickness[0.0002],
        PointSize[0.02],
        lines,

```

```

    Point[{start, g[start]}],
    Line[{{xmin, xmin}, {xmax, xmax}}]
  }
}
],
Axes -> True,
AxesLabel ->
{
  "\!\(\*\SubscriptBox[
StyleBox[\"x\", \nFontSlant->\"Italic\"], \"n\"]\)",
  "\!\(\*\SubscriptBox[
StyleBox[\"x\", \nFontSlant->\"Italic\"],
RowBox[{\n\", \"+\", \"1\"}]]\)"
},
AxesOrigin ->
{
  xmin,
  xmin
},
Ticks -> Automatic,
TicksStyle -> Directive[
  Hue[5/6],
8
],
ImageSize ->
{
  150, 150
},
DisplayFunction -> $DisplayFunction,
PlotRange -> All,
AspectRatio -> Automatic
]
]

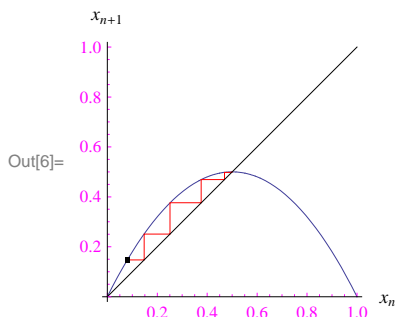
```

```
In[3]:= SetAttributes[ricorsione, Listable]
```

```
In[4]:= Clear[g]
```

```
In[5]:= g[x_] := 2 (x - x^2)
```

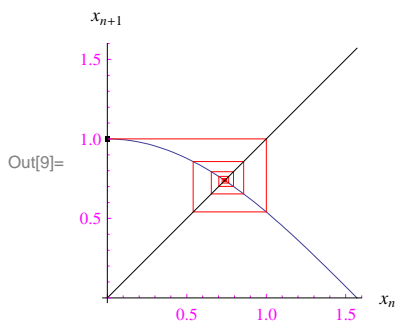
```
In[6]:= ricorsione[g, .08, 0, 50, 0, 1]
```



```
In[7]:= Clear[g]
```

```
In[8]:= g[x_] := Cos[x]
```

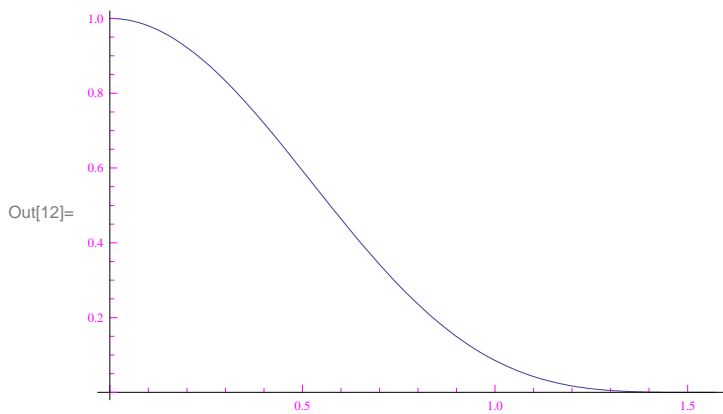
```
In[9]:= ricorsione[g, .001, 0, 170, 0,  $\pi/2$ ]
```



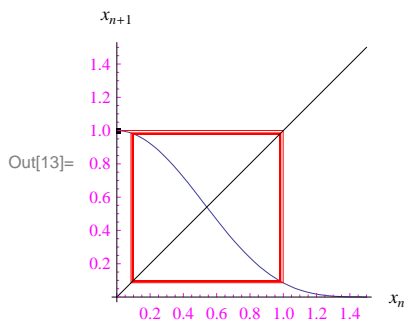
```
In[10]:= Clear[g]
```

```
In[11]:= g[x_] := Cos[x]^4
```

```
In[12]:= Plot[g[x], {x, 0,  $\pi/2$ }]
```



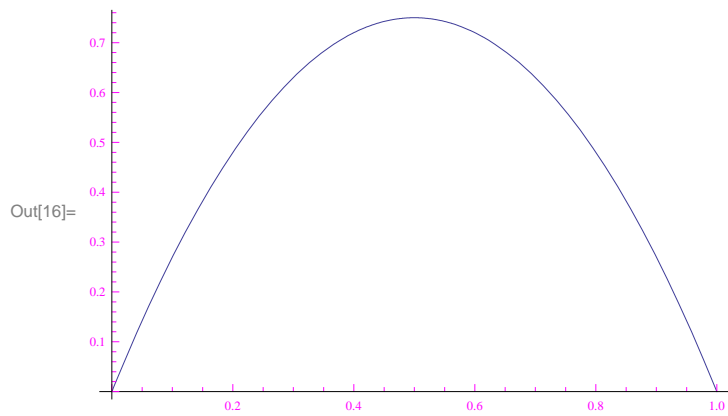
```
In[13]:= ricorsione[g, .01, 0, 250, 0, 1.5]
```



```
In[14]:= Clear[g]
```

```
In[15]:= g[x_] := 3 (x - x^2)
```

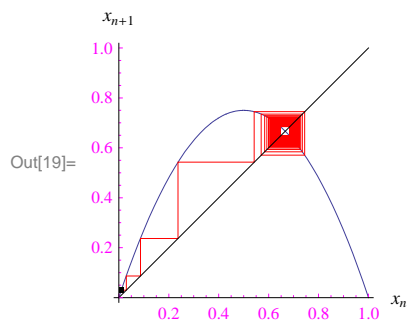
```
In[16]:= Plot[g[x], {x, 0, 1}]
```



```
In[17]:= Clear[g]
```

```
In[18]:= g[x_] := 3 (x - x^2)
```

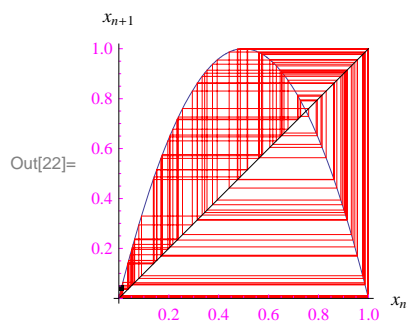
```
In[19]:= orb1 = ricorsione[g, .01, 0, 150, 0, 1]
```



```
In[20]:= Clear[g]
```

```
In[21]:= g[x_] := 4 (x - x^2)
```

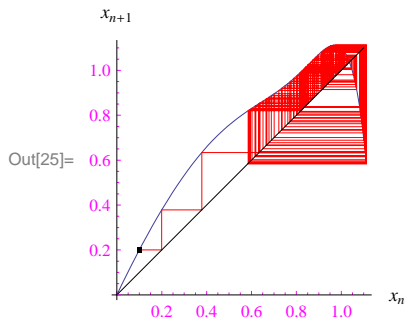
```
In[22]:= orb2 = ricorsione[g, .01, 0, 100, 0, 1]
```



```
In[23]:= Clear[g]
```

```
In[24]:= g[x_] := 2.1 x - x^2 - x^4 + x^6 + x^8 - x^11
```

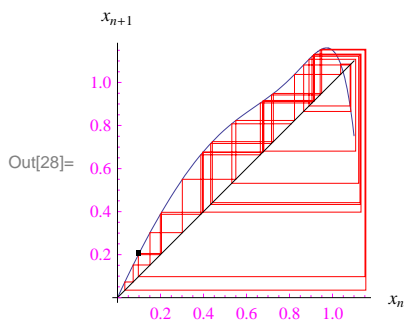
```
In[25]:= orb3 = ricorsione[g, 0.1, 0, 140, 0, 1.1]
```



```
In[26]:= Clear[g]
```

```
In[27]:= g[x_] := 2.15 x - x^2 - x^4 + x^6 + x^8 - x^11
```

```
In[28]:= orb4 = ricorsione[g, 0.1, 0, 40, 0, 1.1]
```



```
In[29]:= arrayplot = GraphicsArray [
  {
    {orb1, orb2},
    {orb3, orb4}
  }
]
```

