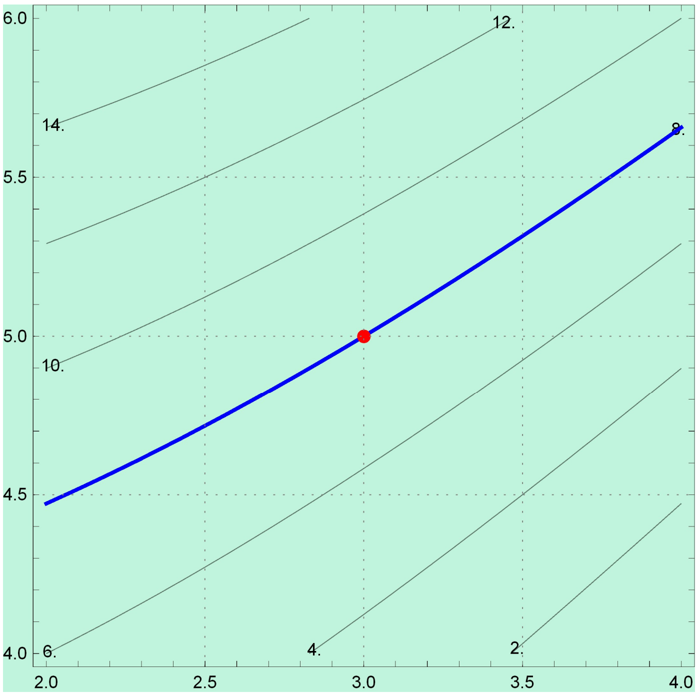
EXERCÍCIOS DA LISTA

EXERCÍCIO 16

(Debug) In[ ]:= $g[x\_, y\_] := \frac{y^2 - x^2}{2};$

```
(Debug) In[ ]:= variasSols = ContourPlot[g[x, y], {x, 2, 4}, {y, 4, 6}, ContourShading → False,
    ContourLabels → True, Background → RGBColor[0.5, 0.91, 0.72, 0.49],
    GridLines → Automatic, GridLinesStyle → {{Gray, Dotted}, {Gray, Dotted}}];

(Debug) In[ ]:= sol = ContourPlot[g[x, y] == 8, {x, 2, 4}, {y, 4, 6}, ContourStyle → {Thick, Blue}];

(Debug) In[ ]:= ponto = Graphics[{PointSize[Large], Red, Point[{3, 5}]}];

(Debug) In[ ]:= Show[variasSols, sol, ponto]
```

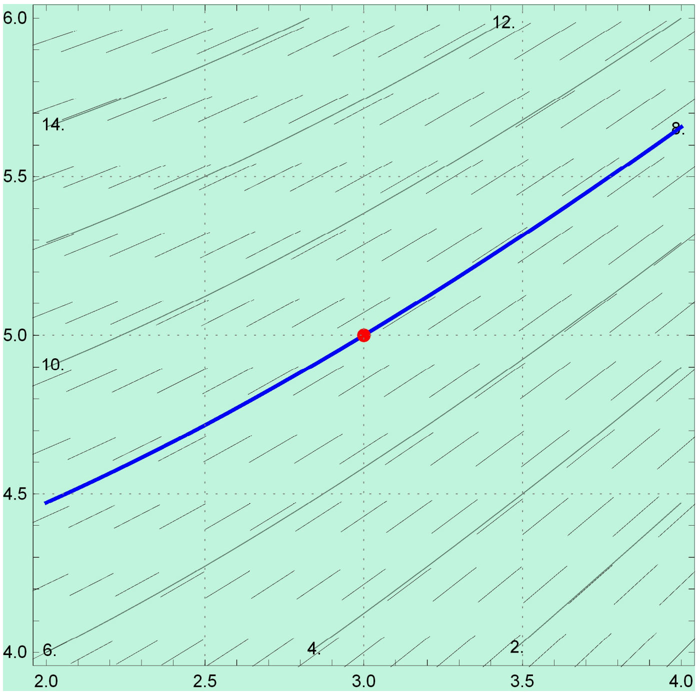
(Debug) Out[ ]=




```
(Debug) In[ ]:= φ[x_, y_] := {y, x}

(Debug) In[ ]:= stream16 = StreamPlot[φ[x, y], {x, 2, 4}, {y, 4, 6}];

(Debug) In[ ]:= vector16 = VectorPlot[φ[x, y], {x, 2, 4},
    {y, 4, 7}, VectorStyle → {Arrowheads[0], Thin, Black}];
```

(Debug) In[ ]:=
```
Show[variasSols, sol, ponto, vector16]
```

(Debug) Out[ ]=



EXERCÍCIO 19

(Debug) In[ ]:=
```
h[x_, y_] := x - x^3 - 1/y;
```

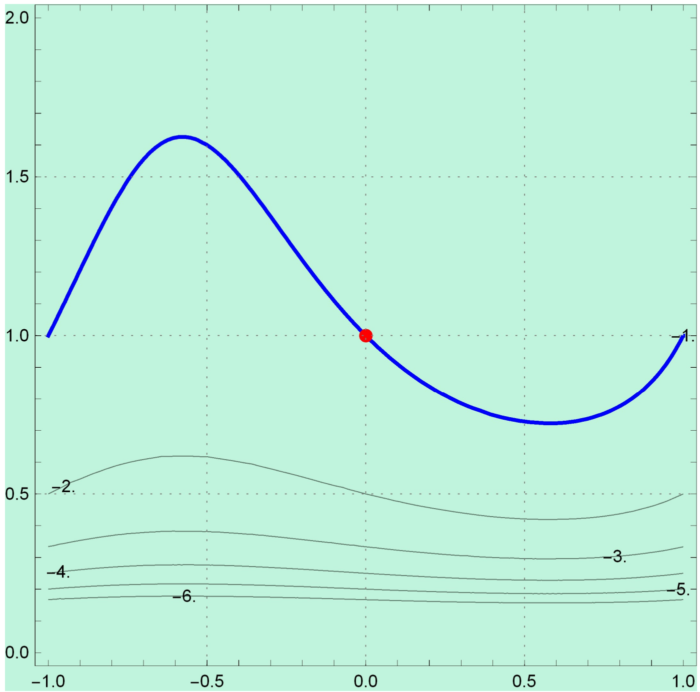
(Debug) In[ ]:=
```
variasSols1 = ContourPlot[h[x, y], {x, -1, 1}, {y, 0, 2}, ContourShading → False,
    ContourLabels → True, Background → RGBColor[0.5, 0.91, 0.72, 0.49],
    GridLines → Automatic, GridLinesStyle → {{Gray, Dotted}, {Gray, Dotted}}];
```

(Debug) In[ ]:=
```
sol1 =
   ContourPlot[h[x, y] == -1, {x, -1, 1}, {y, 0, 2}, ContourStyle → {Thick, Blue}];
```

(Debug) In[ ]:=
```
condicao = Graphics[{PointSize[Large], Red, Point[{0, 1}]}];
```

(Debug) In[ ]:=
```
Show[variasSols1, sol1, condicao]
```

(Debug) Out[ ]=



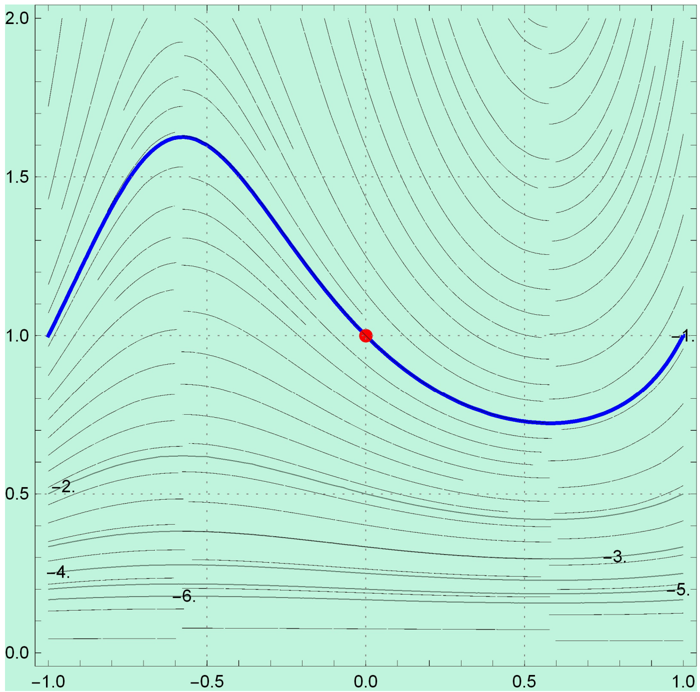
(Debug) In[ ]:= $\phi[x\_, y\_] := \left\{\frac{1}{3\,x^2 - 1}, y^2\right\}$

(Debug) In[ ]:=
```
stream19 = StreamPlot[ϕ[x, y], {x, -1, 1},
    {y, 0, 2}, StreamStyle → {Arrowheads[0], Black, Thin},
    Background → RGBColor[0.5, 0.91, 0.72, 0.49], GridLines → Automatic,
    GridLinesStyle → {{Gray, Dotted}, {Gray, Dotted}}];
```

(Debug) In[ ]:=
```
vector19 = VectorPlot[ϕ[x, y], {x, -1, 1}, {y, 0, 2}];
```

(Debug) In[ ]:=
```
Show[variasSols1, sol1, condicao, stream19]
```

(Debug) Out[ ]=



54 DA PáGINA 58

DEFININDO CAMPO DE DIREçõES

(Debug) In[ ]:= $\gamma[x\_, y\_] := \left\{\frac{1}{y}, 10^{-4}\,y - 10^{-2}\right\}$

(Debug) In[ ]:= $\text{Integrate}\left[\frac{1}{10^{-4}\,y^2 - 10^{-2}\,y}, y\right]$

(Debug) Out[ ]= $10\,000\left(\frac{1}{100}\,\text{Log}[100 - y] - \frac{\text{Log}[y]}{100}\right)$

(Debug) In[ ]:= $g[y\_] := 10\,000\left(\frac{1}{100}\,\text{Log}[100 - y] - \frac{\text{Log}[y]}{100}\right);$

(Debug) In[ ]:=
```
contornos[x_, y_] := g[y] - x;
```

Para 25 jacarés inicialmente...

(Debug) In[ ]:=
```
N[contornos[0, 25]];
```

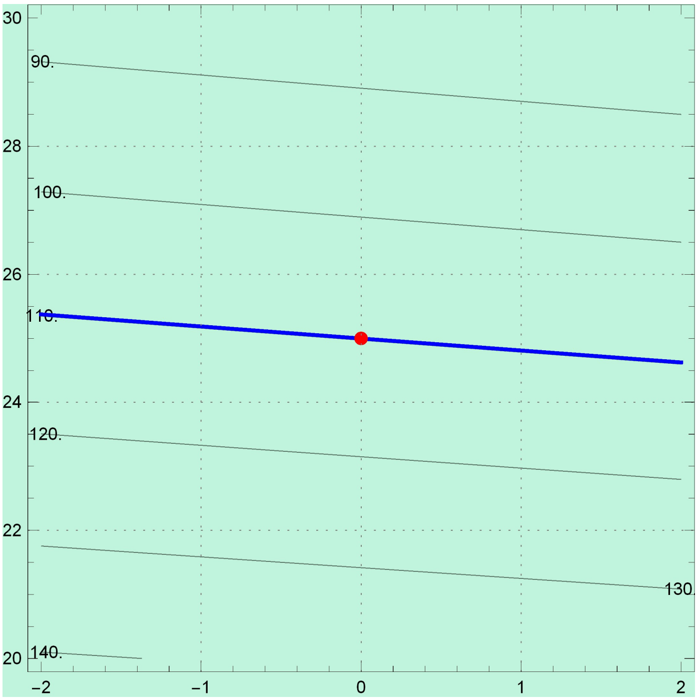
(Debug) In[ ]:=
```
variasSols2 =
  ContourPlot[contornos[x, y], {x, -2, 2}, {y, 20, 30}, ContourShading → False,
   ContourLabels → True, Background → RGBColor[0.5, 0.91, 0.72, 0.49],
   GridLines → Automatic, GridLinesStyle → {{Gray, Dotted}, {Gray, Dotted}}];
```

(Debug) In[ ]:=
```
sol2 = ContourPlot[contornos[x, y] == contornos[0, 25],
   {x, -2, 2}, {y, 20, 30}, ContourStyle → {Thick, Blue}];
```

(Debug) In[ ]:=
```
condicao2 = Graphics[{PointSize[Large], Red, Point[{0, 25}]}];
```

(Debug) In[ ]:=
```
Show[variasSols2, sol2, condicao2]
```

(Debug) Out[ ]=

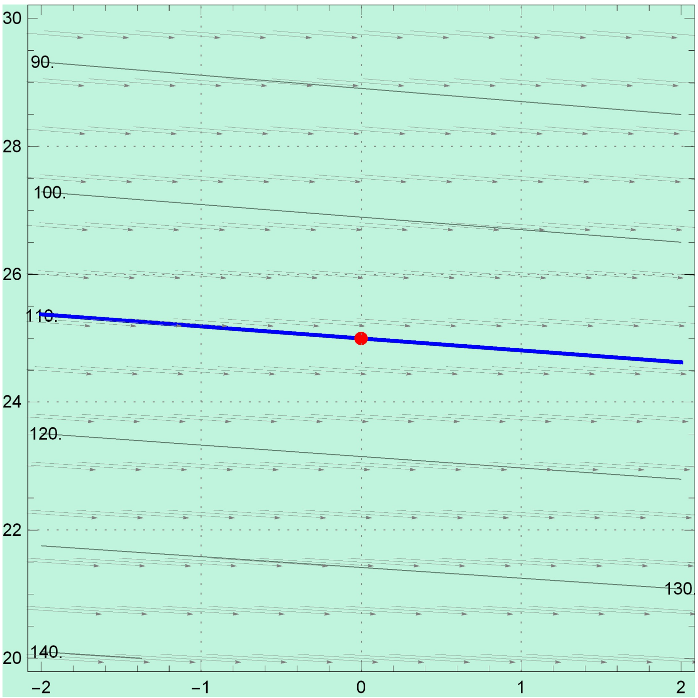


(Debug) In[ ]:=
```
stream54 = StreamPlot[γ[x, y], {x, -2, 2},
    {y, 20, 30}, StreamStyle → {Arrowheads[0], Black, Thin}];
```

(Debug) In[ ]:=
```
vector54 = VectorPlot[γ[x, y], {x, -2, 2}, {y, 20, 30.5},
    VectorStyle → {Arrowheads[0.01], Thickness[.0001], Gray}];
```

(Debug) In[ ]:=
```
Show[variasSols2, sol2, condicao2, vector54]
```

(Debug) Out[ ]=



(Debug) In[ ]:=
```
jacaresMeses = Table[NSolve[g[y] == x + contornos[0, 25], y], {x, 0, 12 × 100}];
```

(Debug) In[ ]:=
```
jacaresMeses[[1200]]
```

(Debug) Out[ ]=
```
{{y → 0.000206865}}
```

Para 150 jacarés inicialmente...

(Debug) In[ ]:=
```
N[contornos[0, 150]]
```

(Debug) Out[ ]=
```
-109.861 + 314.159 i
```

(Debug) In[ ]:=
```
-109.86122886681098` + 314.1592653589793` i
  (* Solução pertencente ao conjunto dos números complexos com
   parte imaginária diferente de zero. *)
```

(Debug) Out[ ]=
```
-109.861 + 314.159 i
```

PROBLEMA 3 DA PáGINA 48

(Debug) In[ ]:=

$$\text{Apart}\left[\frac{1}{y\,(y-1)\,(y-2)}\right]$$

(Debug) Out[ ]=

$$\frac{1}{2\,(-2+y)} - \frac{1}{-1+y} + \frac{1}{2\,y}$$

(Debug) In[ ]:= Integrate[$\frac{1}{2\,(-2+y)} - \frac{1}{-1+y} + \frac{1}{2\,y}$, y]

(Debug) Out[ ]= $-\text{Log}[1-y] + \frac{1}{2}\text{Log}[2-y] + \frac{\text{Log}[y]}{2}$

(Debug) In[ ]:= ρ[y_] := $-\text{Log}[1-y] + \frac{1}{2}\text{Log}[2-y] + \frac{\text{Log}[y]}{2}$;

(Debug) In[ ]:=
```
contornos3[x_, y_] := ρ[y] - x

graph = ContourPlot[contornos3[x, y], {x, -4, 4}, {y, -1, 2},
   PlotPoints → 100, ContourShading → False, ContourStyle → {Blue}];
```

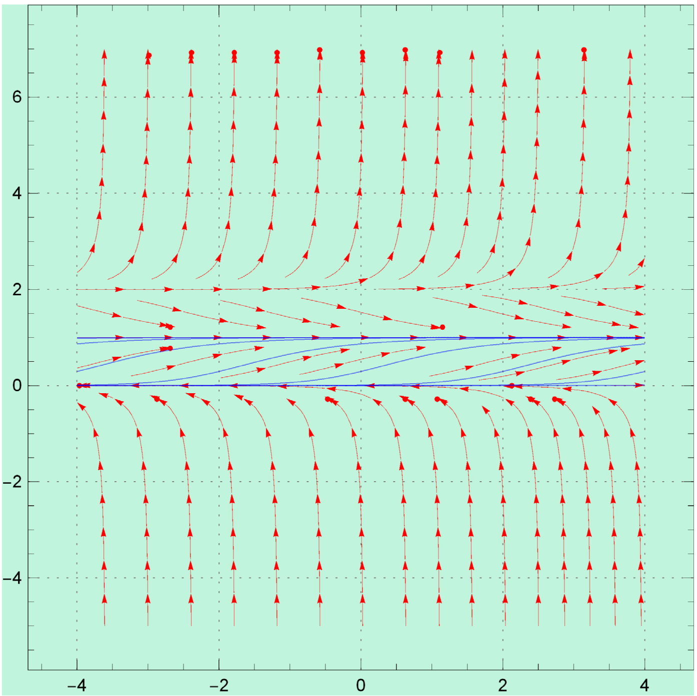
(Debug) In[ ]:= τ[x_, y_] := $\left\{\frac{1}{y}, (y-1)\,(y-2)\right\}$

(Debug) In[ ]:=
```
taudexy =
   StreamPlot[τ[x, y], {x, -4, 4}, {y, -1, 3}, StreamStyle → {Arrowheads[.015]}];
```

(Debug) In[ ]:=
```
taudexyP = StreamPlot[τ[x, y], {x, -4, 4},
   {y, -5, 7}, StreamStyle → {Arrowheads[.015], Thin, Red},
   Background → RGBColor[0.5, 0.91, 0.72, 0.49], GridLines → Automatic,
   GridLinesStyle → {{Gray, Dotted}, {Gray, Dotted}}];
```

(Debug) In[ ]:= Show[taudexyP, graph]

(Debug) Out[ ]=



EXERCÍCIO 39, PÁGINA 132, 11.2

ADOTANDO $X_1 = 3$ E A = 2, TEMOS:

(Debug) In[ ]:= x1 = 3;

(Debug) In[ ]:= A = 2;

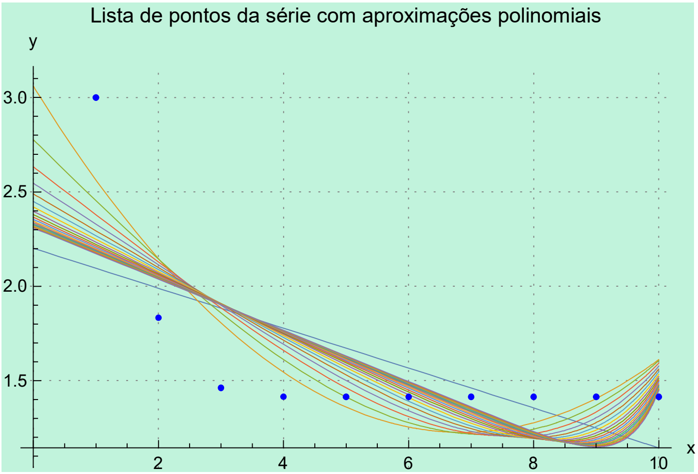
```
(Debug) In[ ]:= x2 = 1/2 (x1 + A/x1);
(Debug) In[ ]:= x3 = 1/2 (x2 + A/x2);
(Debug) In[ ]:= x4 = 1/2 (x3 + A/x3);
(Debug) In[ ]:= x5 = 1/2 (x4 + A/x4);
(Debug) In[ ]:= x6 = 1/2 (x5 + A/x5);
(Debug) In[ ]:= x7 = 1/2 (x6 + A/x6);
(Debug) In[ ]:= x8 = 1/2 (x7 + A/x7);
(Debug) In[ ]:= x9 = 1/2 (x8 + A/x8);
(Debug) In[ ]:= x10 = 1/2 (x9 + A/x9);
(Debug) In[ ]:= listRecorrencia = {x1, x2, x3, x4, x5, x6, x7, x8, x9, x10};
```

Convergência para $\sqrt{2}$

```
(Debug) In[ ]:= listNum = N[listRecorrencia]
(Debug) Out[ ]= {3., 1.83333, 1.46212, 1.415, 1.41421,
  1.41421, 1.41421, 1.41421, 1.41421, 1.41421}

(Debug) In[ ]:= N[√2]
(Debug) Out[ ]= 1.41421

(Debug) In[ ]:= graphicRecorrencia =
  ListPlot[listRecorrencia, PlotStyle → {PointSize[.01], Blue}];

(Debug) In[ ]:= tableCurvas = Table[Fit[listRecorrencia, {1, x, x^n}, x], {n, 1, 20}];
```

(Debug) In[ ]:=
```
Show[Plot[tableCurvas, {x, 0, 10}, PlotStyle → Thin,
  GridLines → Automatic, GridLinesStyle → {{Gray, Dotted}, {Gray, Dotted}},
  AxesLabel → {"x", "y"}, Background → RGBColor[0.5, 0.91, 0.72, 0.49],
  GridLines → Automatic, GridLinesStyle → {{Gray, Dotted}, {Gray, Dotted}},
  PlotLabel → "Lista de pontos da série com aproximações polinomiais"],
 graphicRecorrencia]
```

(Debug) Out[ ]=



EXERCÍCIOS, 36 A 40, PáGINA 141, 11.2

36

(Debug) In[ ]:= Sum$\left[\frac{1}{4\,n^2-1}\right.$, {n, 0, Infinity}]

(Debug) Out[ ]= $-\frac{1}{2}$

37

(Debug) In[ ]:= Sum[Log$\left[\frac{n+1}{n}\right]$, {n, 1, Infinity}];(* Série divergente *)

38

(Debug) In[ ]:= Sum$\left[\frac{4}{16\,n^2-8\,n-3}\right.$, {n, Infinity}]

(Debug) Out[ ]= 1

39

(Debug) In[ ]:= Sum$\left[\frac{2}{n^2-1}\right.$, {n, 2, Infinity}]

(Debug) Out[ ]= $\frac{3}{2}$

40

(Debug) In[ ]:= (* ------------------------------ *)

EXERCÍCIO 40, PáGINA 132, 11.2

(Debug) In[ ]:=
```
Limit[Fibonacci[n + 1]/Fibonacci[n], n → Infinity]
```

(Debug) Out[ ]= $\frac{1}{2}\left(1+\sqrt{5}\right)$

(Debug) In[ ]:=
```
graphFibonatti = ListPlot[Table[Fibonacci[n + 1]/Fibonacci[n], {n, 1, 15, .03}],
   GridLines → Automatic, GridLinesStyle → {{Gray, Dotted}, {Gray, Dotted}},
   Background → LightBlue, PlotStyle → {PointSize[.0045], Blue},
   PlotLabel → "Convergência para 1/2 (1+√5 ) = 1.61803"];
```

(Debug) In[ ]:=
```
Show[graphFibonatti, Plot[1/2 (1 + √5), {x, 0, 500}, PlotStyle → {Thin, Red}],
  Graphics[{Red, Text["y = 0.5 (1+√5 )", {350, 1.616}]}]]
```

(Debug) Out[ ]=