

Lezione 6 (parte quarta)

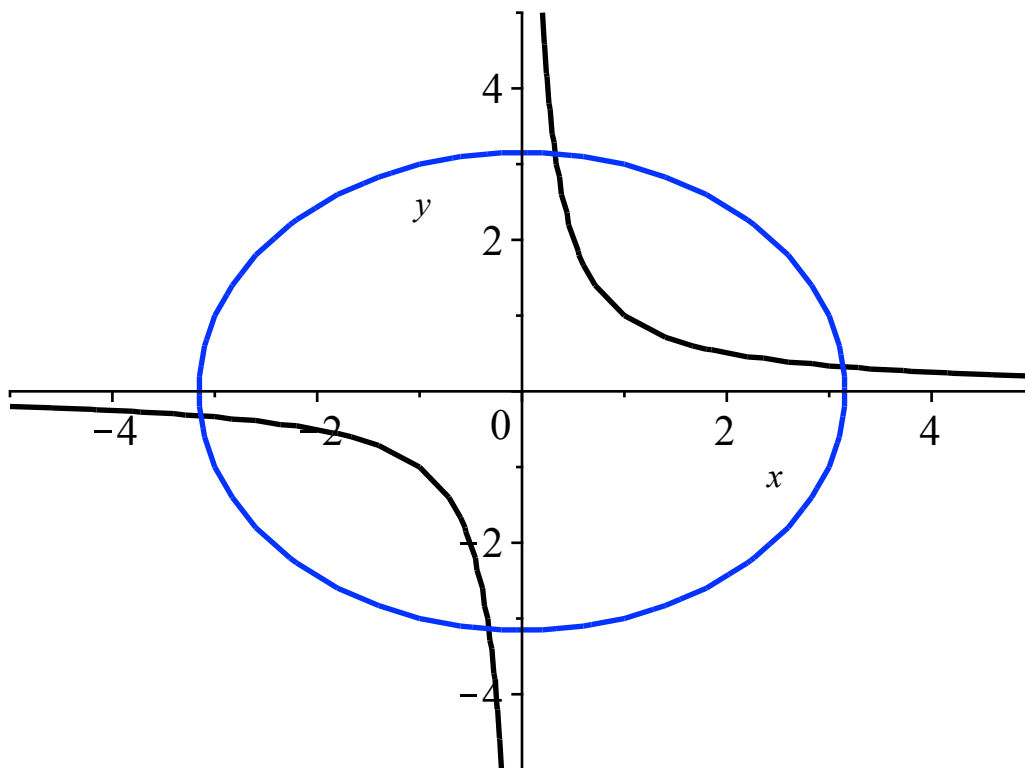
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```
> restart ;
> with(plots):
with(LinearAlgebra) :
Warning, the name changecoords has been redefined

> # componenti della funzione in due variabili
f1 := (x,y) -> x^2+y^2-10 ;
f2 := (x,y) -> x*y-1 ;

f1 := (x,y) -> x^2 + y^2 - 10
f2 := (x,y) -> yx - 1

> # visualizzo le intersezioni
A := implicitplot(f1(x,y)=0,x=-5..5,y=-5..5,
                 thickness=2, color=blue) :
B := implicitplot(f2(x,y)=0,x=-5..5,y=-5..5,
                 thickness=2, color=black) :
display({A,B});
```



```
> # scrivo in forma vettoriale la mappa
F := (x,y) -> <f1(x,y),f2(x,y)> ;
F := (x,y) -> rtable/ConstructColumn(f1(x,y),f2(x,y))
```

(1)

(2)

```

> # componenti della matrice Jacobiano
JF11 := unapply(diff(f1(x,y),x),(x,y)) ;
JF12 := unapply(diff(f1(x,y),y),(x,y)) ;
JF21 := unapply(diff(f2(x,y),x),(x,y)) ;
JF22 := unapply(diff(f2(x,y),y),(x,y)) ;
      JF11 := (x,y) → 2 x
      JF12 := (x,y) → 2 y
      JF21 := (x,y) → y
      JF22 := (x,y) → x

```

(3)

```

> # matrice Jacobiano
JF := (x,y) -> <<JF11(x,y),JF21(x,y)>|
      <JF12(x,y),JF22(x,y)>> ;
JF := (x,y) → rtable/ConstructRow(rtable/ConstructColumn(JF11(x,y),JF21(x,y)),
      rtable/ConstructColumn(JF12(x,y),JF22(x,y)))

```

(4)

```

> # procedura iterativa di Newton
NEWTON := (x,y) -> <x,y> - JF(x,y)^(-1).F(x,y) ;
      NEWTON := (x,y) → rtable/ConstructColumn(x,y) - `(`(1/JF(x,y),F(x,y))

```

(5)

```

> # eseguo alcune iterate
PT[0] := <2,4> ;
PT[1] := evalf(NEWTON(PT[0][1],PT[0][2]),10) ;
PT[2] := evalf(NEWTON(PT[1][1],PT[1][2]),10) ;
PT[3] := evalf(NEWTON(PT[2][1],PT[2][2]),10) ;
PT[4] := evalf(NEWTON(PT[3][1],PT[3][2]),10) ;
PT[5] := evalf(NEWTON(PT[4][1],PT[4][2]),10) ;
      PT0 :=  $\begin{bmatrix} 2 \\ 4 \end{bmatrix}$ 

```

(6)

$$PT_1 := \begin{bmatrix} 0.5000000000 \\ 3.5000000000 \end{bmatrix}$$

$$PT_2 := \begin{bmatrix} 0.3333333333 \\ 3.1666666667 \end{bmatrix}$$

$$PT_3 := \begin{bmatrix} 0.3179271707 \\ 3.146358544 \end{bmatrix}$$

$$PT_4 := \begin{bmatrix} 0.3178372476 \\ 3.146264373 \end{bmatrix}$$

$$PT_5 := \begin{bmatrix} 0.3178372450 \\ 3.146264370 \end{bmatrix}$$

```
> C := plot([seq([PT[i][1],PT[i][2]],i=0..5)],  
            color=red,thickness=5) ;  
> # andamento delle iterate  
display({A,B,C}) ;
```

