

versione 0

Equazioni differenziali – 0

```
Dsolve[{y'[x] == (2 x y[x] + 3 y[x])/(2 Log[y[x]/2]), y[-4] == 2 e^2},  
y[x], x]  
{y[x] -> 2 e^(sqrt(x(3+x)))}
```

Funzioni di due variabili, punti critici – 0

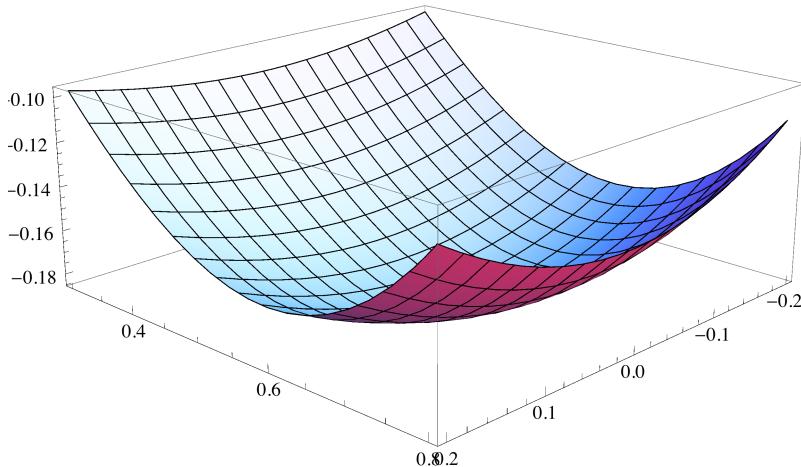
```
g[x_, y_] := y^2 Log[x^2 + y]  
f[x_, y_] := g[x, y]; Expand[f[x, y]]  
y^2 Log[x^2 + y]  
grad = Expand[{D[f[x, y], x], D[f[x, y], y]}]  
{2 x y^2/(x^2 + y), y^2/(x^2 + y) + 2 y Log[x^2 + y]}  
Solve[grad == {0, 0}, {x, y}]  
Solve::dinv:  
The expression (x^2 + y)^(y/x^2) involves unknowns in more than one argument, so inverse functions  
cannot be used. >>  
Solve::dinv:  
The expression (x^2 + y)^(y/x^2) involves unknowns in more than one argument, so inverse functions  
cannot be used. >>  
Solve[{2 x y^2/(x^2 + y), y^2/(x^2 + y) + 2 y Log[x^2 + y]} == {0, 0}, {x, y}]  
H[x_, y_] = {{partial_x_x f[x, y], partial_x_y f[x, y]},  
{partial_y_x f[x, y], partial_y_y f[x, y]} };  
Simplify[MatrixForm[H[x, y]]]  

$$\begin{pmatrix} \frac{2 y^2 (-x^2+y)}{(x^2+y)^2} & \frac{2 x y (2 x^2+y)}{(x^2+y)^2} \\ \frac{2 x y (2 x^2+y)}{(x^2+y)^2} & \frac{y (4 x^2+3 y)}{(x^2+y)^2} + 2 \operatorname{Log}[x^2+y] \end{pmatrix}$$
  
Simplify[MatrixForm[H[0, e^(y/x^2)]]]  

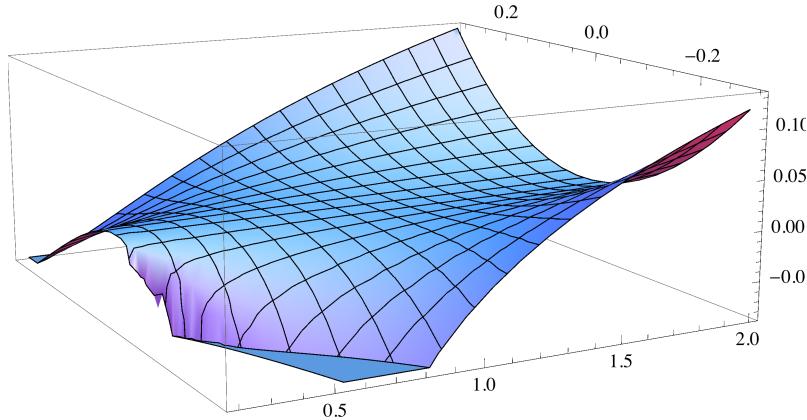
$$\begin{pmatrix} \frac{2}{\sqrt{e}} & 0 \\ 0 & 2 \end{pmatrix}  
N[e^(y/x^2)]  
0.606531$$

```

```
Plot3D[f[x, y], {x, -.2, .2}, {y, .3, .8}, PlotPoints → 20]
```



```
Plot3D[f[x, y], {x, .2, 2}, {y, -.3, .3}, PlotPoints → 20]
```



$$x^4 - 8 y - 2 x^2 y + 2 y^2$$

$$\{4 (x^3 - x y), -2 (4 + x^2 - 2 y)\}$$

$$\{\{y \rightarrow 2, x \rightarrow 0\}, \{y \rightarrow 4, x \rightarrow -2\}, \{y \rightarrow 4, x \rightarrow 2\}\}$$

$$\begin{pmatrix} 12 x^2 - 4 y & -4 x \\ -4 x & 4 \end{pmatrix}$$

$$\left\{ \begin{pmatrix} -8 & 0 \\ 0 & 4 \end{pmatrix}, \begin{pmatrix} 32 & 8 \\ 8 & 4 \end{pmatrix}, \begin{pmatrix} 32 & -8 \\ -8 & 4 \end{pmatrix} \right\}$$

Integrale doppio – 0

$$f[x_, y_] := \frac{1}{x};$$

$$\text{Simplify}\left[\left\{\int_{3-x}^{\frac{x}{2}} f[x, y] dy,\right.$$

$$\left.\int_2^3 \int_{3-x}^{\frac{x}{2}} f[x, y] dy dx\right\}]$$

$$\left\{\frac{3}{2} - \frac{3}{x}, \frac{3}{2} - 3 \text{Log}\left[\frac{3}{2}\right]\right\}$$

$$\begin{aligned} f[x_, y_] &:= \frac{1}{x}; \\ \text{Simplify}\left[\left\{\int_{x=3}^{\frac{x}{2}} f[x, y] dy,\right.\right. \\ &\quad \left.\left.\int_3^6 \int_{x=3}^{\frac{x}{2}} f[x, y] dy dx\right\}\right] \\ &\left\{-\frac{1}{2} + \frac{3}{x}, -\frac{3}{2} + \text{Log}[8]\right\} \\ \text{Simplify}\left[\int_2^6 \int_{\text{Abs}[x=3]}^{\frac{x}{2}} f[x, y] dy dx\right] \\ &\text{Log}\left[\frac{64}{27}\right] \end{aligned}$$

Numero complesso – 0

```
In[1]:= Solve[z^2 - 3 z + 3 + I == 0, z]
Out[1]= {{z → 1 + I}, {z → 2 - I}}
```

Matrice, autovalori... – 0

```
In[6]:= a[k_] := {{2, 0, 0}, {1, 4 - k, k}, {1, 0, -2}};
Print[MatrixForm[a[k].v]];
Solve[a[k].v == r v, {r, k}]
{{0, -4 + 3 k, -4}}
Out[8]= {{r → -2, k → 2}}
```

```
In[13]:= Print[MatrixForm[a[2]]]; Print[Eigenvalues[a[2]]]; Eigenvectors[a[2]]
{{2, 0, 0}, {1, 2, 2}, {1, 0, -2}}
{-2, 2, 2}
Out[13]= {{0, -1, 2}, {0, 1, 0}, {0, 0, 0}}
```

versione 1

Equazioni differenziali – 1

```
DSolve[{y'[x] == (x y[x] - 4 y[x]) / Log[y[x]/3], y[-1] == 3 e^3},
y[x], x]
```

Funzioni di due variabili, punti critici – 1

```
g[x_, y_] := y^2 Log[x^2 + y]
```

```

f[x_, y_] := g[y, 2 x] / 4; Expand[f[x, y]]
x^2 Log[2 x + y^2]

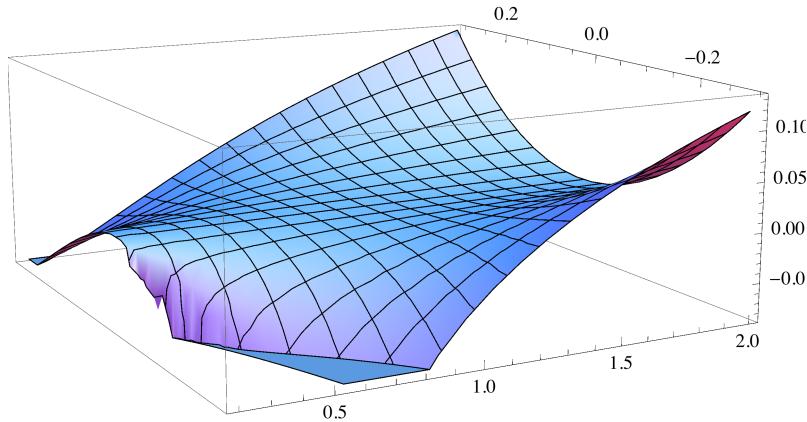
grad = Expand[{D[f[x, y], x], D[f[x, y], y]}]
{2 x^2/(2 x + y^2) + 2 x Log[2 x + y^2], 2 x^2 y/(2 x + y^2)}

Solve[grad == {0, 0}, {x, y}]
Solve::dinv:
The expression  $(x^2 + y)^{\frac{y}{x^2}}$  involves unknowns in more than one argument, so inverse functions
cannot be used. >>

Solve::dinv:
The expression  $(x^2 + y)^{\frac{y}{x^2}}$  involves unknowns in more than one argument, so inverse functions
cannot be used. >>

Solve[{2 x y^2/(x^2 + y), -y^2/(x^2 + y) + 2 y Log[x^2 + y]} == {0, 0}, {x, y}]
{{x -> 0, y -> 0}, {x -> 0, y -> 0}, {x -> 0.606531, y -> 0.157487}, {x -> -0.606531, y -> 0.157487}, {x -> 0.25, y -> 0.25}, {x -> -0.25, y -> 0.25}, {x -> 0.157487, y -> 0.606531}, {x -> -0.157487, y -> 0.606531}, {x -> 0.0866025, y -> 0.866025}, {x -> -0.0866025, y -> 0.866025}, {x -> 0.05, y -> 0.95}, {x -> -0.05, y -> 0.95}, {x -> 0.025, y -> 0.975}, {x -> -0.025, y -> 0.975}, {x -> 0.0125, y -> 0.9875}, {x -> -0.0125, y -> 0.9875}, {x -> 0.00625, y -> 0.99375}, {x -> -0.00625, y -> 0.99375}, {x -> 0.003125, y -> 0.996875}, {x -> -0.003125, y -> 0.996875}, {x -> 0.0015625, y -> 0.9984375}, {x -> -0.0015625, y -> 0.9984375}, {x -> 0.00078125, y -> 0.9991875}, {x -> -0.00078125, y -> 0.9991875}, {x -> 0.000390625, y -> 0.99953125}, {x -> -0.000390625, y -> 0.99953125}, {x -> 0.0001953125, y -> 0.9998125}, {x -> -0.0001953125, y -> 0.9998125}, {x -> 0.00009765625, y -> 0.99990625}, {x -> -0.00009765625, y -> 0.99990625}, {x -> 0.000048828125, y -> 0.999953125}, {x -> -0.000048828125, 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-0.00000000000000000000546648583031242178733928125, y -> 0.9999999999999999999999999999953125}, {x -> 0.000000000000000000002733242915156221091669640625, y -> 0.9999999999999999999999999999990625}, {x -> -0.000000000000000000002733242915156221091669640625, y -> 0.9999999999999999999999999999990625}, {x -> 0.0000000000000000000013666214575781105458348203125, y -> 0.99999999999999999999999999999953125}, {x -> -0.0000000000000000000013666214575781105458348203125, y -> 0.99999999999999999999999999999953125}, {x -> 0.00000000000000000000068331072878895527291741015625, y -> 0.99999999999999999999999999999990625}, {x -> -0.00000000000000000000068331072878895527291741015625, y -> 0.99999999999999999999999999999990625}, {x -> 0.00000000000000000000034165536439447763645870515625, y -> 0.999999999999999999999999999999953125}, {x -> -0.00000000000000000000034165536439447763645870515625, y -> 0.999999999999999999999999999999953125}, {x -> 0.0000000000000000000001708276821972388182293525625, y -> 0.999999999999999999999999999999990625}, {x -> -0.0000000000000000000001708276821972388182293525625, y -> 0.999999999999999999999999999999990625}, {x -> 0.00000000000000000000008541384109861940911467625625, y -> 0.9999999999999999999999999999999953125}, {x -> -0.00000000000000000000008541384109861940911467625625, y -> 0.9999999999999999999999999999999953125}, {x -> 0.000000000000000000000042706920549309704557288125, y -> 0.9999999999999999999999999999999990625}, {x -> -0.000000000000000000000042706920549309704557288125, y -> 0.9999999999999999999999999999999990625}, {x -> 0.0000000000000000000000213534602746548522786440625, y -> 0.99999999999999999999999999999999953125}, {x -> -0.0000000000000000000000213534602746548522786440625, y -> 0.99999999999999999999999999999999953125}, {x -> 0.00000000000000000000001067673013732742613932203125, y -> 0.99999999999999999999999999999999990625}, {x -> -0.00000000000000000000001067673013732742613932203125, y -> 0.99999999999999999999999999999999990625}, {x -> 0.00000000000000000000000533836506866371306966103125, y -> 0.999999999999999999999999999999999953125}, {x -> -0.00000000000000000000000533836506866371306966103125, y -> 0.999999999999999999999999999999999953125}, {x -> 0.000000000
```

```
Plot3D[f[x, y], {x, -2, 2}, {y, -0.3, 0.3}, PlotPoints → 20]
```



$$x^4 - 8xy - 2x^2y + 2y^2$$

$$\{4(x^3 - xy), -2(4 + x^2 - 2y)\}$$

$$\{\{y \rightarrow 2, x \rightarrow 0\}, \{y \rightarrow 4, x \rightarrow -2\}, \{y \rightarrow 4, x \rightarrow 2\}\}$$

$$\begin{pmatrix} 12x^2 - 4y & -4x \\ -4x & 4 \end{pmatrix}$$

$$\left\{ \begin{pmatrix} -8 & 0 \\ 0 & 4 \end{pmatrix}, \begin{pmatrix} 32 & 8 \\ 8 & 4 \end{pmatrix}, \begin{pmatrix} 32 & -8 \\ -8 & 4 \end{pmatrix} \right\}$$

Integrale doppio – 1

$$f[x_, y_] := \frac{1}{x};$$

$$\text{Simplify}\left[\left\{\int_{\frac{3}{2}-x}^{\frac{x}{2}} f[x, y] dy,\right.$$

$$\left.\int_1^{\frac{3}{2}} \int_{\frac{3}{2}-x}^{\frac{x}{2}} f[x, y] dy dx\right\}]$$

$$\left\{ \frac{3(-1+x)}{2x}, \frac{3}{4} - \frac{3}{2} \text{Log}\left[\frac{3}{2}\right] \right\}$$

$$f[x_, y_] := \frac{1}{x};$$

$$\text{Simplify}\left[\left\{\int_{x-\frac{3}{2}}^{\frac{x}{2}} f[x, y] dy,\right.$$

$$\left.\int_{\frac{3}{2}}^3 \int_{x-\frac{3}{2}}^{\frac{x}{2}} f[x, y] dy dx\right\}]$$

$$\left\{ -\frac{-3+x}{2x}, \frac{3}{4} (-1 + \text{Log}[4]) \right\}$$

$$\text{Simplify}\left[\int_1^3 \int_{\text{Abs}\left[x-\frac{3}{2}\right]}^{\frac{x}{2}} f[x, y] dy dx\right]$$

$$\text{Log}\left[\frac{8}{3\sqrt{3}}\right]$$

Numero complesso – 1

In[14]:= **Solve**[$z^2 - 3 z + 1 + 3 i == 0$, z]

Out[14]= $\{\{z \rightarrow i\}, \{z \rightarrow 3 - i\}\}$

Matrice, autovalori... - 1

In[15]:= $a[k_] := \begin{pmatrix} 3 & 0 & 0 \\ 1 & 4 - k & k \\ 1 & 0 & -3 \end{pmatrix}; v = \begin{pmatrix} 0 \\ 1 \\ -6 \end{pmatrix};$

Print[**MatrixForm**[$a[k].v$]];
Solve[$a[k].v == r v$, { r , k }]

$$\begin{pmatrix} 0 \\ 4 - 7k \\ 18 \end{pmatrix}$$

Out[17]= $\{\{r \rightarrow -3, k \rightarrow 1\}\}$

In[18]:= **Print**[**MatrixForm**[$a[1]$]]; **Print**[**Eigenvalues**[$a[1]$]]; **Eigenvectors**[$a[1]$]

$$\begin{pmatrix} 3 & 0 & 0 \\ 1 & 3 & 1 \\ 1 & 0 & -3 \end{pmatrix}$$

$\{-3, 3, 3\}$

Out[18]= $\{\{0, -1, 6\}, \{0, 1, 0\}, \{0, 0, 0\}\}$