

versione 0

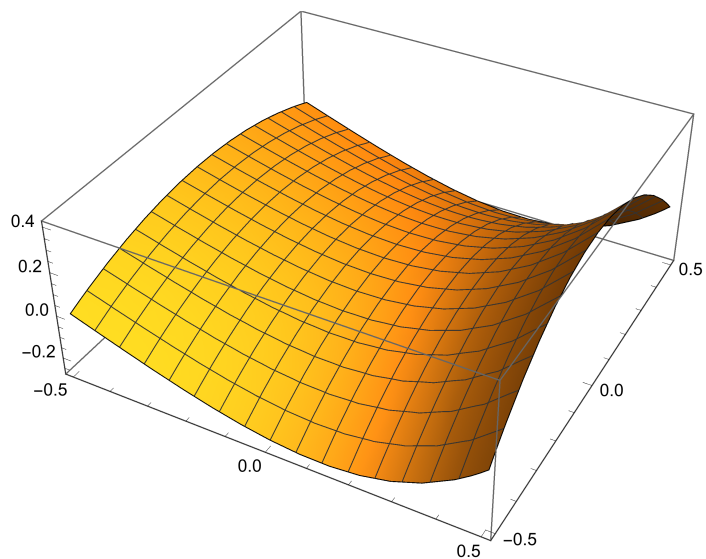
Equazioni differenziali – 0

```
Expand[DSolve[{Y'[x] ==  $\frac{y[x]^2 - 4}{2 x y[x]}$ ,  
  Y[e] == 1},  
  Y[x], x]]  
{ {Y[x] →  $\frac{\sqrt{4 e^{-3 x}}}{\sqrt{e}}$  } }
```

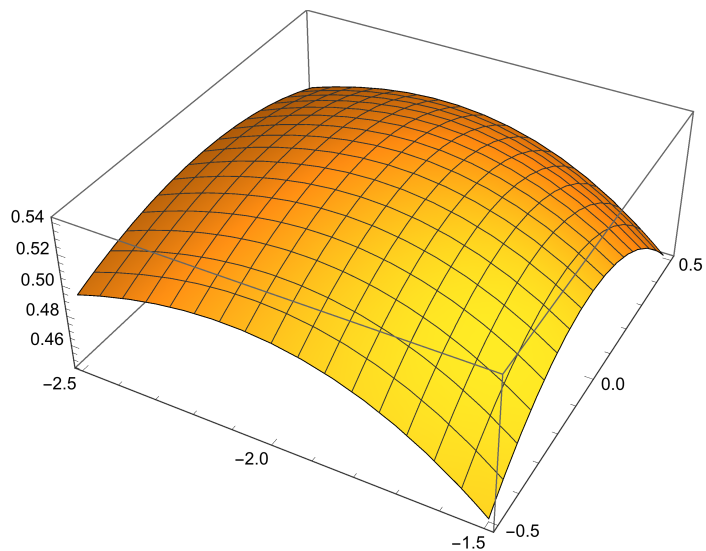
Funzioni di due variabili, punti critici – 0

```
f[x_, y_] := (x^2 - y^2) e^x  
Expand[f[x, y]]  
e^x x^2 - e^x y^2  
  
grad = Simplify[{Together[D[f[x, y], x]], Together[D[f[x, y], y]]}]  
{e^x (2 x + x^2 - y^2), -2 e^x y}  
  
Solve[grad == {0, 0}, {x, y}]  
{ {x → -2, y → 0}, {x → 0, y → 0} }  
  
H[x_, y_] =  
  {{D[f[x, y], x, x], D[f[x, y], x, y]}, {D[f[x, y], x, y], D[f[x, y], y, y]}};  
H[x, y];  
Print[MatrixForm[H[x, y]]];  
( 2 e^x + 4 e^x x + e^x (x^2 - y^2)  -2 e^x y )  
  -2 e^x y  -2 e^x )  
  
Print[{MatrixForm[H[0, 0]], MatrixForm[H[-2, 0]]}];  
{ ( 2 0 ), ( - $\frac{2}{e^2}$  0 ) }  
  ( 0 -2 ), ( 0 - $\frac{2}{e^2}$  ) }
```

```
Plot3D[f[x, y], {x, -.5, .5}, {y, -.5, .5}]
```



```
Plot3D[f[x, y], {x, -2.5, -1.5}, {y, -.5, .5}]
```



Integrale doppio – 0

```

f[x_, y_] := x^3;
Print[ $\int_{1-\sqrt{y}}^{\sqrt{1-y^2}}$  f[x, y] dx];
Print[ $\int_0^1 \int_{1-\sqrt{y}}^{\sqrt{1-y^2}}$  f[x, y] dx dy];
Print[ $\int_{(x-1)^2}^{\sqrt{1-x^2}}$  f[x, y] dy];
Print[ $\int_0^1 \int_{(x-1)^2}^{\sqrt{1-x^2}}$  f[x, y] dy dx]

```

$$\sqrt{y} - \frac{3y}{2} + y^{3/2} - \frac{3y^2}{4} + \frac{y^4}{4}$$

$$\frac{7}{60}$$

$$x^3 \left(-(-1+x)^2 + \sqrt{1-x^2} \right)$$

$$\frac{7}{60}$$

Numeri complessi – 0

$$z = \frac{1}{2+i} e^{(2+i)7}; \{ \text{Re}[z], \text{Im}[z] \}$$

$$\left\{ \frac{2}{5} e^{14} \cos[7] + \frac{1}{5} e^{14} \sin[7], -\frac{1}{5} e^{14} \cos[7] + \frac{2}{5} e^{14} \sin[7] \right\}$$

Matrici, autovalori – 0

$$a = \frac{1}{2} \begin{pmatrix} 1 & -\sqrt{3} \\ -\sqrt{3} & -1 \end{pmatrix}; \text{MatrixForm}[a]$$

$$\begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ -\frac{\sqrt{3}}{2} & -\frac{1}{2} \end{pmatrix}$$

Eigenvalues[a]

$$\{-1, 1\}$$

Eigenvectors[a]

$$\left\{ \left\{ \frac{1}{\sqrt{3}}, 1 \right\}, \left\{ -\sqrt{3}, 1 \right\} \right\}$$

m = Orthogonalize[{{ $\frac{1}{\sqrt{3}}$, 1}, {- $\sqrt{3}$, 1}}]; MatrixForm[m]

$$\begin{pmatrix} \frac{1}{2} & \frac{\sqrt{3}}{2} \\ -\frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix}$$

m1 = Transpose[m]; d = Simplify[m.a.m1]; MatrixForm[d]

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

versione I

Equazioni differenziali – I

```
Expand[DSolve[{Y'[x] ==  $\frac{y[x]^2 - 9}{2 x y[x]}$ ,
  Y[e] == -4},
  Y[x], x]]
{{Y[x] →  $-\frac{\sqrt{9 e + 7 x}}{\sqrt{e}}$ }}
```

Funzioni di due variabili, punti critici – I

```
f[x_, y_] := (x^2 - y^2) e^-y
Expand[f[x, y]]
e^-y x^2 - e^-y y^2

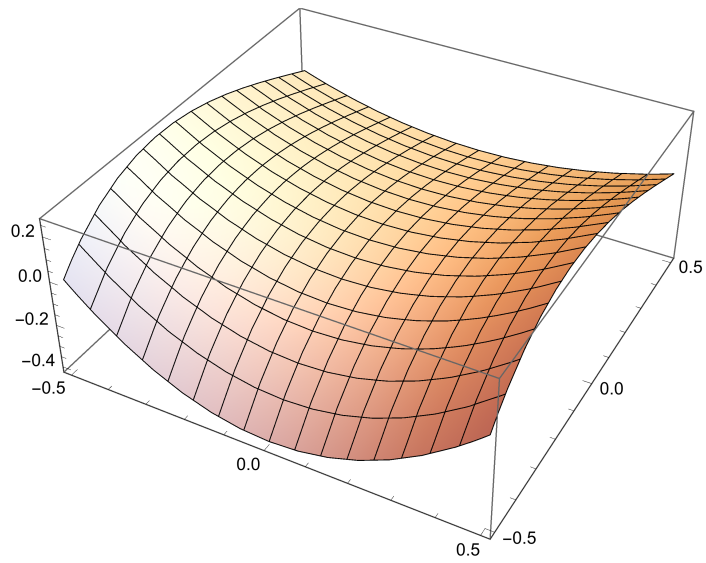
grad = Simplify[{Together[D[f[x, y], x]], Together[D[f[x, y], y]]}]
{2 e^-y x, e^-y (-x^2 + (-2 + y) y)}

Solve[grad == {0, 0}, {x, y}]
{{x → 0, y → 0}, {x → 0, y → 2}}

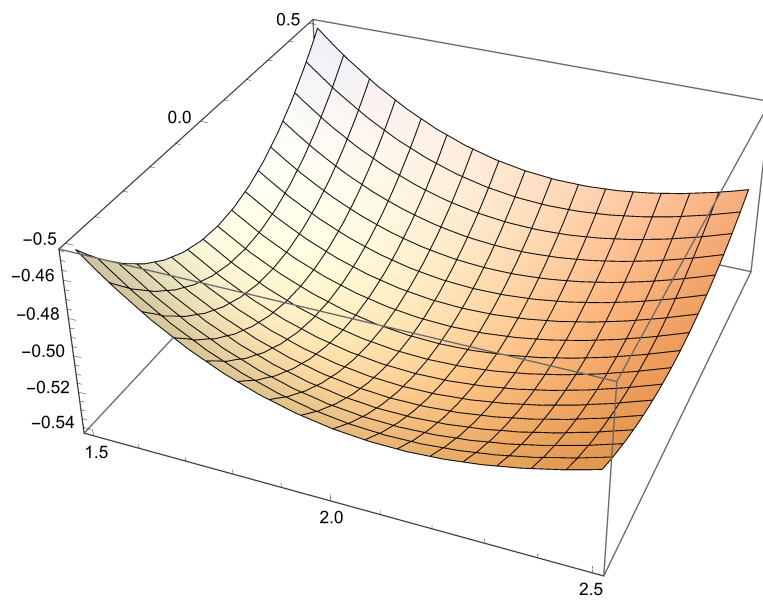
H[x_, y_] =
  {{D[f[x, y], x, x], D[f[x, y], x, y]}, {D[f[x, y], x, y], D[f[x, y], y, y]}};
H[x, y];
Print[MatrixForm[H[x, y]]];
( 2 e^-y          -2 e^-y x
 -2 e^-y x  -2 e^-y + 4 e^-y y + e^-y (x^2 - y^2) )

Print[{MatrixForm[H[0, 0]], MatrixForm[H[0, 2]]}];
{{(2 0), (2/e^2 0)}, (0 -2), (0 2/e^2)}
```

```
Plot3D[f[x, y], {x, -.5, .5}, {y, -.5, .5}]
```



```
Plot3D[f[x, y], {y, 2.5, 1.5}, {x, -.5, .5}]
```



Integrale doppio – I

```

f[x_, y_] := x3;
Print[ $\int_{-\sqrt{1-y^2}}^{-1+\sqrt{y}}$  f[x, y] dx];
Print[ $\int_0^1 \int_{-\sqrt{1-y^2}}^{-1+\sqrt{y}}$  f[x, y] dx dy];
Print[ $\int_{(x+1)^2}^{\sqrt{1-x^2}}$  f[x, y] dy];
Print[ $\int_{-1}^0 \int_{(x+1)^2}^{\sqrt{1-x^2}}$  f[x, y] dy dx]

```

$$-\sqrt{y} + \frac{3y}{2} - y^{3/2} + \frac{3y^2}{4} - \frac{y^4}{4}$$

$$-\frac{7}{60}$$

$$x^3 \left(-(1+x)^2 + \sqrt{1-x^2} \right)$$

$$-\frac{7}{60}$$

Numeri complessi – 0

```
Clear["Global`*"]
```

$$z = \frac{1}{3-i} e^{(3-i) \cdot 2}; \{\text{Re}[z], \text{Im}[z]\}$$

$$\left\{ \frac{3}{10} e^6 \text{Cos}[2] - \frac{1}{10} \text{Im}[e^{6-2i}], \frac{1}{10} e^6 \text{Cos}[2] + \frac{3}{10} \text{Im}[e^{6-2i}] \right\}$$

Matrici, autovalori – 0

$$a = \frac{1}{2} \begin{pmatrix} 0 & -\sqrt{3} \\ -\sqrt{3} & 0 \end{pmatrix}; \text{MatrixForm}[a]$$

$$\begin{pmatrix} 0 & -\frac{\sqrt{3}}{2} \\ -\frac{\sqrt{3}}{2} & 0 \end{pmatrix}$$

```
Eigenvalues[a]
```

$$\left\{ -\frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{2} \right\}$$

```
Eigenvectors[a]
```

$$\{\{1, 1\}, \{-1, 1\}\}$$

```
m = Orthogonalize[\{\{1, 1\}, \{-1, 1\}\}]; MatrixForm[m]
```

$$\begin{pmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix}$$

```
m1 = Transpose[m]; d = Simplify[m.a.m1]; MatrixForm[d]
```

$$\begin{pmatrix} -\frac{\sqrt{3}}{2} & 0 \\ 0 & \frac{\sqrt{3}}{2} \end{pmatrix}$$