versione 0

Equazioni differenziali – 0

In[2]:= `Simplify[DSolve[{y'[x] == 3 x * ∛(y[x] + 2), y[√5] == -1}, y[x], x]]`

Out[2]= $\left\{\left\{y[x] \to -2 - 4\sqrt{-4+x^2} + x^2\sqrt{-4+x^2}\right\}\right\}$

Funzioni di due variabili, punti critici – 0

In[20]:= `g[x_, y_] := -y^2 Log[x^2 + y^2]`

In[21]:= `f[x_, y_] := g[x, y]; Expand[f[x, y]]`

Out[21]= $-y^2 \operatorname{Log}[x^2+y^2]$

In[22]:= `grad = Expand[{D[f[x, y], x], D[f[x, y], y]}]`

Out[22]= $\left\{-\frac{2 x y^2}{x^2+y^2}, -\frac{2 y^3}{x^2+y^2} - 2 y \operatorname{Log}[x^2+y^2]\right\}$

In[24]:= `Reduce[grad=={0,0},{x,y}]`

Out[24]= $\left(x == 0 \&\& \left(y == -\frac{1}{\sqrt{e}} \mid\mid y == \frac{1}{\sqrt{e}}\right)\right) \mid\mid$
$((\operatorname{Re}[x] < 0 \mid\mid (\operatorname{Re}[x] == 0 \&\& (\operatorname{Im}[x] < 0 \mid\mid \operatorname{Im}[x] > 0)) \mid\mid \operatorname{Re}[x] > 0) \&\& y == 0)$

In[25]:= $H[x\_, y\_] = \begin{pmatrix} \partial_{x,x} f[x,y] & \partial_{x,y} f[x,y] \\ \partial_{y,x} f[x,y] & \partial_{y,y} f[x,y] \end{pmatrix};$

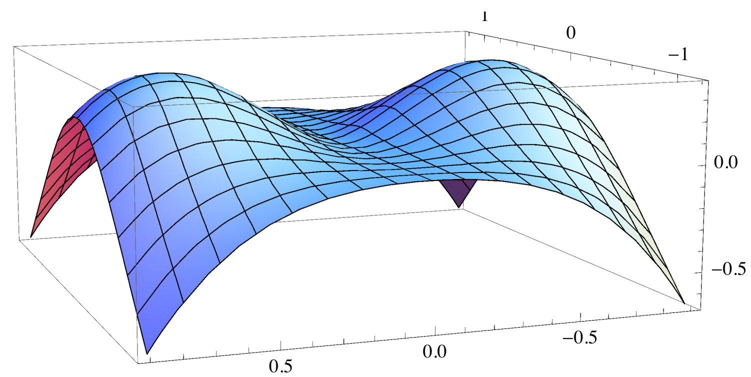
`Simplify[MatrixForm[H[x, y]]]`

Out[26]//MatrixForm=
$$\begin{pmatrix} \frac{2 y^2 (x^2-y^2)}{(x^2+y^2)^2} & -\frac{4 x^3 y}{(x^2+y^2)^2} \\ -\frac{4 x^3 y}{(x^2+y^2)^2} & -\frac{2 (5 x^2 y^2 + 3 y^4)}{(x^2+y^2)^2} - 2 \operatorname{Log}[x^2+y^2] \end{pmatrix}$$

In[27]:= $\text{MatrixForm}\left[H\left[0, e^{\frac{-1}{2}}\right]\right]$

Out[27]//MatrixForm=
$$\begin{pmatrix} -2 & 0 \\ 0 & -4 \end{pmatrix}$$

In[28]:= `Plot3D[f[x, y], {x, -1.2, 1.2}, {y, -.9, .9}, PlotPoints → 20]`

Out[28]=


Integrale doppio – 0

In[29]:= `f[x_, y_] := ` e^{-y^2}`;`
`Simplify[{` $\int_{-2y}^{2y} f[x, y]\, dx$, $\int_0^2 \int_{-2y}^{2y} f[x, y]\, dx\, dy$ `}]`

Out[30]= $\left\{4\, e^{-y^2}\, y,\ 2 - \frac{2}{e^4}\right\}$

Numero complesso – 0

In[31]:= `Reduce[` $z^2 + 2\sqrt{3}\, z + 12 == 0$ `]`

Out[31]= $z == -3\, i - \sqrt{3}\ ||\ z == 3\, i - \sqrt{3}$

Matrice, autovalori… – 0

In[33]:= `v = ( 1  1  2 ); a = Transpose[v].v; Print[MatrixForm[a]]; Eigenvalues[a]`

$$\begin{pmatrix} 1 & 1 & 2 \\ 1 & 1 & 2 \\ 2 & 2 & 4 \end{pmatrix}$$

Out[33]= {6, 0, 0}

In[36]:= `Eigenvectors[a]`

Out[36]= {{1, 1, 2}, {-2, 0, 1}, {-1, 1, 0}}

In[35]:= `Orthogonalize[Eigenvectors[a]]`

Out[35]= $\left\{\left\{\frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \sqrt{\frac{2}{3}}\right\}, \left\{-\frac{2}{\sqrt{5}}, 0, \frac{1}{\sqrt{5}}\right\}, \left\{-\frac{1}{\sqrt{30}}, \sqrt{\frac{5}{6}}, -\sqrt{\frac{2}{15}}\right\}\right\}$

versione 1

Equazioni differenziali – 1

In[37]:= `Simplify[DSolve[{y'[x] == 3 x *` $\sqrt[3]{y[x] + 1}$ `, y[-3] == 0},`
`y[x], x]]`

Out[37]= $\left\{\left\{y[x] \to -1 - 8\sqrt{-8 + x^2} + x^2\sqrt{-8 + x^2}\right\}\right\}$

Funzioni di due variabili, punti critici – 1

In[38]:= `g[x_, y_] :=` x^2 `Log[` $x^2 + y^2$ `]`

In[39]:= `f[x_, y_] := g[x, y]; Expand[f[x, y]]`

Out[39]= $x^2\, \mathrm{Log}[x^2 + y^2]$

In[40]:= `grad = Expand[{D[f[x, y], x], D[f[x, y], y]}]`

Out[40]= $\left\{\frac{2x^3}{x^2 + y^2} + 2x\, \mathrm{Log}[x^2 + y^2],\ \frac{2x^2 y}{x^2 + y^2}\right\}$

In[41]:= `Reduce[grad=={0,0},{x,y}]`

Out[41]= $\left(\left(x == -\frac{1}{\sqrt{e}} \;||\; x == \frac{1}{\sqrt{e}}\right) \&\&\, y == 0\right) \;||\; (y \neq 0 \,\&\&\, x == 0)$

In[42]:= $H[x\_, y\_] = \begin{pmatrix} \partial_{x,x} f[x, y] & \partial_{x,y} f[x, y] \\ \partial_{y,x} f[x, y] & \partial_{y,y} f[x, y] \end{pmatrix};$

`Simplify[MatrixForm[H[x, y]]]`

Out[43]//MatrixForm=

$$\begin{pmatrix} 2\left(\frac{3 x^4+5 x^2 y^2}{(x^2+y^2)^2} + \mathrm{Log}\left[x^2 + y^2\right]\right) & \frac{4 x y^3}{(x^2+y^2)^2} \\ \frac{4 x y^3}{(x^2+y^2)^2} & \frac{2 (x^4-x^2 y^2)}{(x^2+y^2)^2} \end{pmatrix}$$

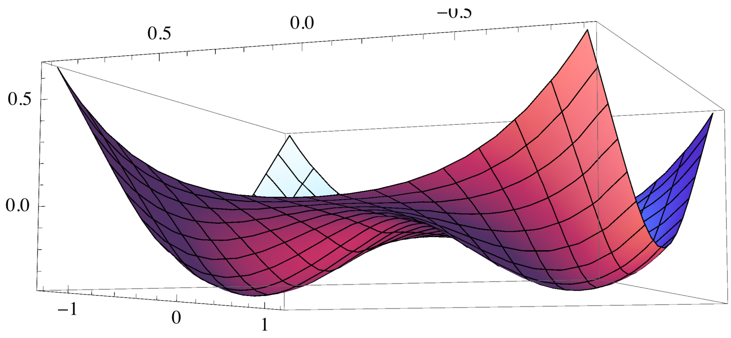
In[44]:= $\mathrm{MatrixForm}\left[H\left[e^{\frac{-1}{2}}, 0\right]\right]$

Out[44]//MatrixForm=

$$\begin{pmatrix} 4 & 0 \\ 0 & 2 \end{pmatrix}$$

In[45]:= `Plot3D[f[x, y], {y, -1.2, 1.2}, {x, -.9, .9}, PlotPoints → 20]`

Out[45]=



Integrale doppio – 1

In[46]:= $f[x\_, y\_] := e^{-2 x^2};$

$\mathrm{Simplify}\left[\left\{\int_{-x}^{x} f[x, y]\, dy,\; \int_0^4 \int_{-x}^{x} f[x, y]\, dy\, dx\right\}\right]$

Out[47]= $\left\{2\, e^{-2 x^2} x,\; \frac{1}{2} - \frac{1}{2\, e^{32}}\right\}$

Numero complesso – 1

In[48]:= $\mathrm{Reduce}\left[z^2 + 6\sqrt{2}\, z + 36 == 0\right]$

Out[48]= $z == (-3 - 3\, i)\sqrt{2} \;||\; z == (-3 + 3\, i)\sqrt{2}$

Matrice, autovalori… – 1

In[49]:= `v = ( 1  2  2 ); a = Transpose[v].v; Print[MatrixForm[a]]; Eigenvalues[a]`

$$\begin{pmatrix} 1 & 2 & 2 \\ 2 & 4 & 4 \\ 2 & 4 & 4 \end{pmatrix}$$

Out[49]= {9, 0, 0}

In[50]:= **Eigenvectors[a]**

Out[50]= {{1, 2, 2}, {-2, 0, 1}, {-2, 1, 0}}

In[51]:= **Orthogonalize[Eigenvectors[a]]**

Out[51]= $\left\{\left\{\frac{1}{3}, \frac{2}{3}, \frac{2}{3}\right\}, \left\{-\frac{2}{\sqrt{5}}, 0, \frac{1}{\sqrt{5}}\right\}, \left\{-\frac{2}{3\sqrt{5}}, \frac{\sqrt{5}}{3}, -\frac{4}{3\sqrt{5}}\right\}\right\}$