versione 0

Equazioni differenziali – 0

```
Expand[DSolve[{3 y''[x] + y'[x] == 8 + 10 e^(-2 x), y[0] == 5, y'[0] == 10},
  y[x], x]]
```

$\{\{y[x] \to 16 + e^{-2x} - 12\, e^{-x/3} + 8x\}\}$

Funzioni di due variabili, punti critici – 0

```
f[x_, y_] := x Log[x^2 + y^2];
grad = Expand[{∂x f[x, y], ∂y f[x, y]}];
Print[grad];
Print[Solve[grad == {0, 0}, {x, y}]];
H[x_, y_] = {{∂x,x f[x, y], ∂x,y f[x, y]}, {∂y,x f[x, y], ∂y,y f[x, y]}};
Print[Simplify[MatrixForm[H[x, y]]]];
Print[Simplify[MatrixForm[H[0, 1]]]];
Print[Simplify[MatrixForm[H[e^-1, 0]]]];
Plot3D[f[x, y], {x, -.8, .8}, {y, -1.3, 1.3}]
Plot3D[f[x, y], {x, .1, .8}, {y, -.3, .3}]
Plot3D[f[x, y], {x, -.1, -.8}, {y, -.3, .3}]
Plot3D[f[x, y], {x, -.3, .3}, {y, .6, 1.4}]
Plot3D[f[x, y], {x, -.3, .3}, {y, -.6, -1.4}]
```

$$\left\{\frac{2x^2}{x^2+y^2} + \mathrm{Log}[x^2+y^2],\ \frac{2xy}{x^2+y^2}\right\}$$

Solve::dinv :

The expression $(x^2+y^2)^{1+\frac{y^2}{x^2}}$ involves unknowns in more than one argument, so inverse functions cannot be used. ≫

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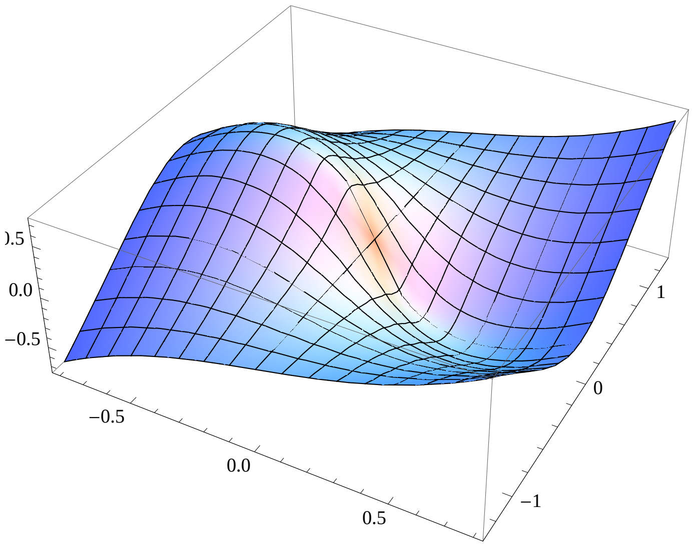
$$\mathrm{Solve}\left[\left\{\frac{2x^2}{x^2+y^2} + \mathrm{Log}[x^2+y^2],\ \frac{2xy}{x^2+y^2}\right\} == \{0, 0\}, \{x, y\}\right]$$

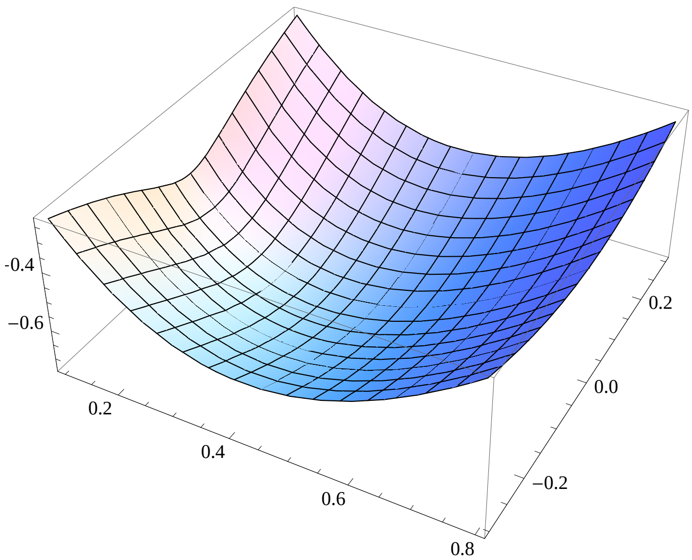
$$\begin{pmatrix} \frac{2(x^3+3xy^2)}{(x^2+y^2)^2} & \frac{-2x^2y+2y^3}{(x^2+y^2)^2} \\ \frac{-2x^2y+2y^3}{(x^2+y^2)^2} & \frac{2(x^3-xy^2)}{(x^2+y^2)^2} \end{pmatrix}$$

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

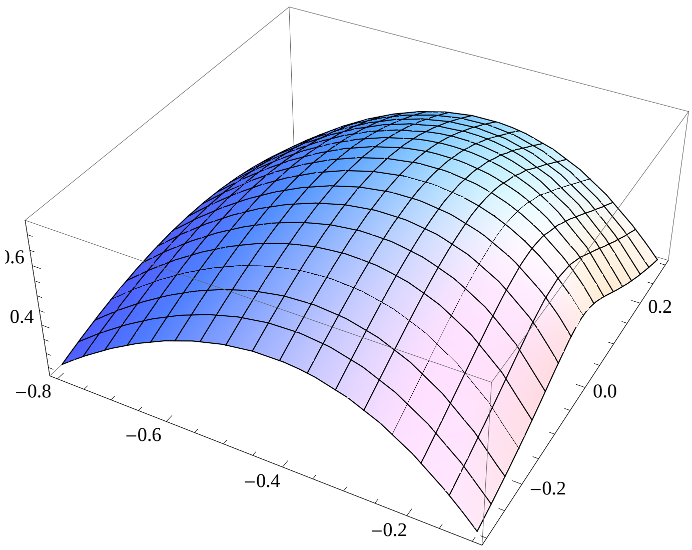
$$\begin{pmatrix} 2e & 0 \\ 0 & 2e \end{pmatrix}$$



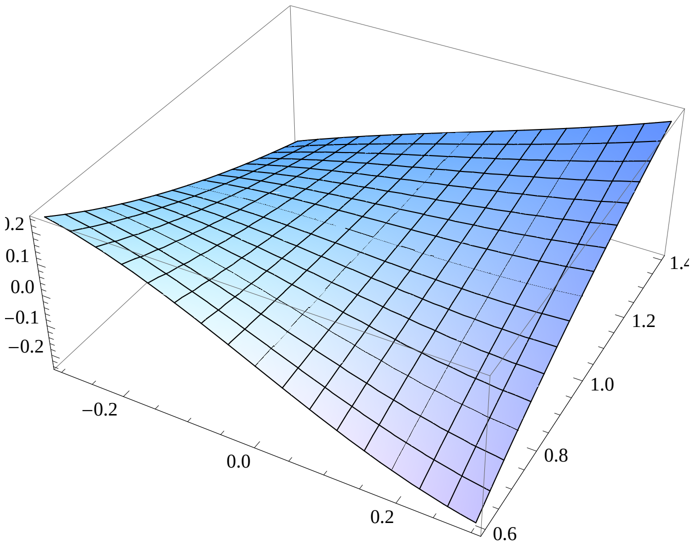
).5
0.0
−0.5
−0.5
0.0
0.5
1
0
−1

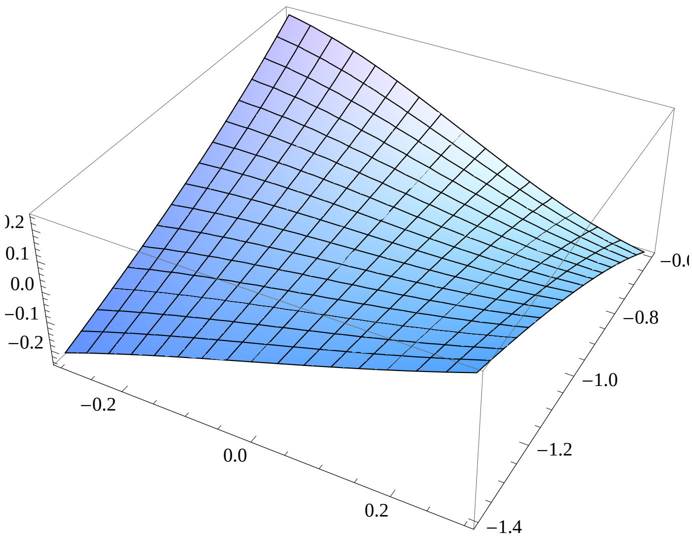


-0.4
−0.6
0.2
0.4
0.6
0.8
0.2
0.0
−0.2



).6
0.4
−0.8
−0.6
−0.4
−0.2
0.2
0.0
−0.2

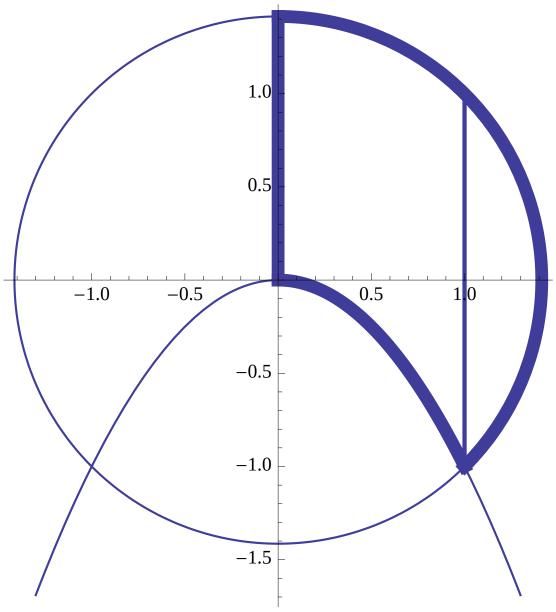




Integrale doppio – 0

In[1]:=
```
a = ParametricPlot[√2 {0, t}, {t, 0, 1}, PlotStyle → AbsoluteThickness[6]];
b = ParametricPlot[{1, t}, {t, -1, 1}, PlotStyle → AbsoluteThickness[2]];
aa = ParametricPlot[√2 {Cos[t], Sin[t]}, {t, -Pi, Pi}, PlotStyle → AbsoluteThickness[1]];
ab = Plot[-x^2, {x, -1.3, 1.3}, PlotStyle → AbsoluteThickness[1]];
ac = ParametricPlot[√2 {Cos[t], Sin[t]},
   {t, -Pi / 4, Pi / 2}, PlotStyle → AbsoluteThickness[6]];
ad = Plot[-x^2, {x, 0, 1}, PlotStyle → AbsoluteThickness[6]];
Show[aa, ab, ac, ad, a, b, AspectRatio → Automatic, PlotRange → All]
```

Out[5]=




```
f[x_, y_] := y;
```

Simplify$\left[\left\{\int_{-x^2}^{\sqrt{2-x^2}} y\, dy,\ \int_0^1 \int_{-x^2}^{\sqrt{2-x^2}} y\, dy\, dx\right\}\right]$

$\left\{\frac{1}{2}\left(2-x^2-x^4\right),\ \frac{11}{15}\right\}$

```
f[x_, y_] := y;
```

Simplify$\left[\left\{\int_{-\sqrt{2-x^2}}^{\sqrt{2-x^2}} y\, dy,\ \int_1^{©} \int_{-\sqrt{2-x^2}}^{\sqrt{2-x^2}} y\, dy\, dx\right\}\right]$

{0, 0}

```
f[x_, y_] := y;
```

Simplify$\left[\left\{\int_{\sqrt{-y}}^{\sqrt{2-y^2}} y\, dx,\ \int_{-1}^{0} \int_{\sqrt{-y}}^{\sqrt{2-y^2}} y\, dx\, dy\right\}\right]$

$\left\{y\left(-\sqrt{-y}+\sqrt{2-y^2}\right),\ \frac{11}{15}-\frac{2\sqrt{2}}{3}\right\}$

```
f[x_, y_] := y;
```

$$\text{Simplify}\left[\left\{\int_0^{\sqrt{2-y^2}} y\,dx,\ \int_0^{\sqrt{2}}\int_0^{\sqrt{2-y^2}} y\,dx\,dy\right\}\right]$$

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

Numeri complessi – 0

In[16]:= $z = \left(\sqrt{3} - i\right)^2 * e^{\frac{\pi}{4} i};$

```
{Re[z], Im[z]}
```

Out[17]= $\left\{\sqrt{2}+\sqrt{6},\ \sqrt{2}-\sqrt{6}\right\}$

In[18]:= `Arg[z]`

Out[18]= $\text{ArcTan}\left[\frac{\sqrt{2}-\sqrt{6}}{\sqrt{2}+\sqrt{6}}\right]$

In[19]:= $N\left[\frac{180}{\pi}\,\%\right]$

Out[19]= -15.

In[20]:= `Abs[z]`

4

Matrici, autovalori – 0

In[23]:= `Clear[z]`

In[30]:= $b = \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix}$; a = b.b.b; MatrixForm[a]

Out[30]//MatrixForm=

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

In[31]:= `Eigenvectors[a]`

Out[31]= {{1, 0}, {0, 0}}

In[27]:= `MatrixForm[Inverse[a]]`

Out[27]//MatrixForm=

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