versione 0

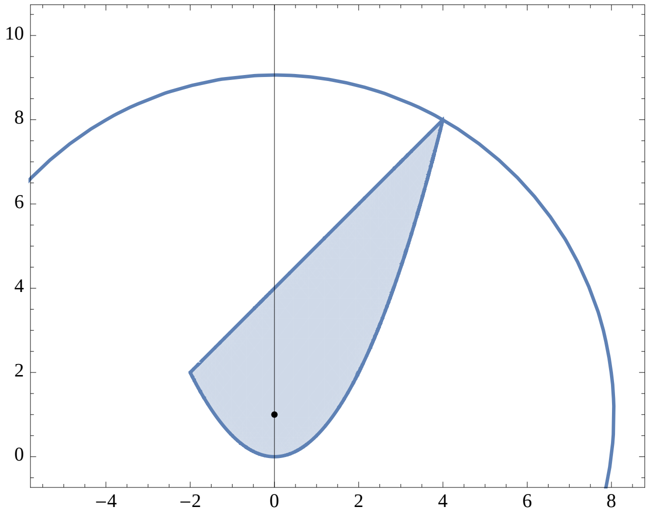
Equazioni differenziali – 0

```
Simplify[DSolve[{
   4 y''[x] + y'[x] == 3 x^2 + 8 x,
   y[0] == 100, y'[0] == 44
  }, y[x], x]]
```

$\{\{y[x] \to 20 + 80\, e^{-x/4} + 64\, x - 8\, x^2 + x^3\}\}$

Funzioni di due variabili, punti critici – 0

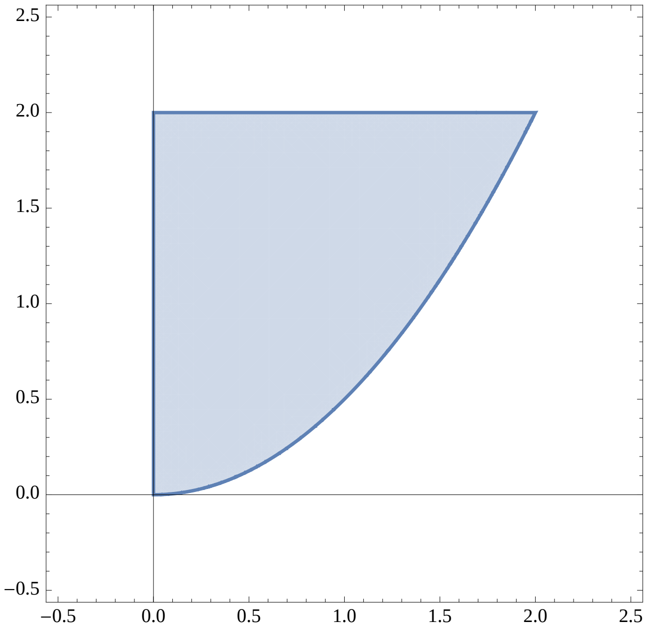
```
f[x_, y_] := x^2 + y^2 - 2 y;
aa = RegionPlot[{1/2 x^2 < y < x + 4}, {x, -2.5, 4.5}, {y, -0.5, 8.5}, MaxRecursion → 10];
ab = ContourPlot[{f[x, y] == f[4, 8]}, {x, -12, 12}, {y, -12, 12}];
ac = Graphics[Point[{0, 1}]];
Show[aa, ab, ac, AspectRatio → Automatic, Axes → {True, True},
 PlotRange → {{-5.5, 8.5}, {-0.5, 10.5}},
 Ticks → {{}, {-2, 2}}]
Print[{f[0, 1], f[8, 4]}]
```




```
{-1, 72}
```

Integrale doppio – 0

```
f[x_, y_] := x * ⅇ^(y^2);
aa = RegionPlot[{2 y > x^2 && 2 > x > 0 && 0 < y < 2}, {x, -0.5, 2.5}, {y, -0.5, 2.5}, MaxRecursion → 10];
Show[aa, AspectRatio → Automatic, Axes → True,
 Ticks → {{-2, 1, 2}, {-2, 2}}]
```



$\int_0^{\sqrt{2y}} f[x, y]\, dx$

$e^{y^2}\, y$

$\int_0^2 \int_0^{\sqrt{2y}} f[x, y]\, dx\, dy$

$\frac{1}{2}\left(-1 + e^4\right)$

Numeri complessi – 0

In[1]:= $\{\text{Abs}[(-i - \sqrt{3})],\ \text{Arg}[(-i - \sqrt{3})]\}$

Out[1]= $\{2,\ -\frac{5\pi}{6}\}$

In[2]:= $\{\text{Abs}[(-i - \sqrt{3})^9],\ \text{Arg}[(-i - \sqrt{3})^9]\}$

Out[2]= $\{512,\ \frac{\pi}{2}\}$

In[3]:= $\text{Solve}[z^3 == (-i - \sqrt{3})^9,\ z]$

Out[3]= $\{\{z \to -8\, i\},\ \{z \to 8\, (-1)^{1/6}\},\ \{z \to 8\, (-1)^{5/6}\}\}$

In[7]:= $\text{Print}[\text{Table}[$

$\{\text{Abs}[(-i - \sqrt{3})^9]^{\frac{1}{3}} * \text{Cos}[\frac{1}{3} \text{Arg}[(-i - \sqrt{3})^9] + \frac{2 k \pi}{3}],$

$\text{Abs}[(-i - \sqrt{3})^9]^{\frac{1}{3}} * \text{Sin}[\frac{1}{3} \text{Arg}[(-i - \sqrt{3})^9] + \frac{2 k \pi}{3}]\},\ \{k, 0, 2\}]]$

$\{\{4\sqrt{3},\ 4\},\ \{-4\sqrt{3},\ 4\},\ \{0,\ -8\}\}$

Matrici, autovalori – 0

In[29]:= $A = \frac{1}{4}\begin{pmatrix} 13 & -3\sqrt{3} \\ -3\sqrt{3} & 7 \end{pmatrix}$;

```
Print[Eigenvalues[A]]; Print[Orthogonalize[Eigenvectors[A]]]
```

{4, 1}

$\left\{\left\{-\frac{\sqrt{3}}{2}, \frac{1}{2}\right\}, \left\{\frac{1}{2}, \frac{\sqrt{3}}{2}\right\}\right\}$

In[28]:= $m = \begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix}$; MatrixForm[Transpose[m].A.m]

Out[28]//MatrixForm=

$\begin{pmatrix} 1 & 0 \\ 0 & 4 \end{pmatrix}$

versione 1

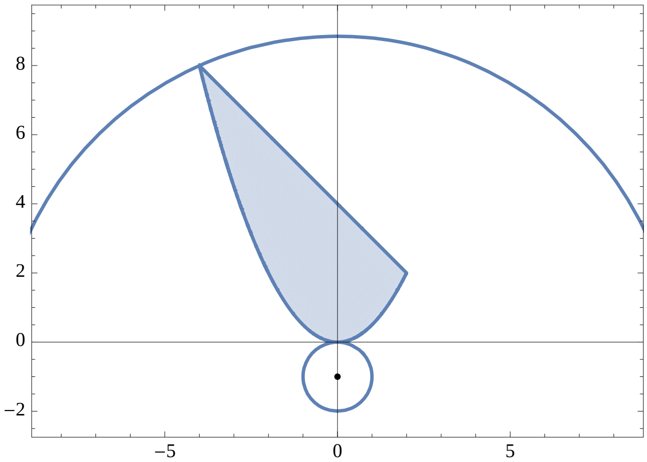
Equazioni differenziali – 1

```
Simplify[DSolve[{
   4 y''[x] - y'[x] == 3 x^2 - 8 x,
   y[0] == 100, y'[0] == -44
  }, y[x], x]]
```

$\{\{y[x] \to 20 + 80\, e^{x/4} - 64\, x - 8\, x^2 - x^3\}\}$

Funzioni di due variabili, punti critici – 1

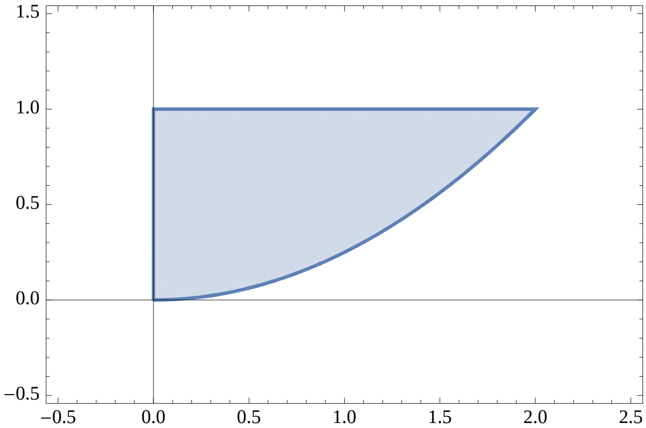
```
f[x_, y_] := x^2 + y^2 + 2 y;
aa = RegionPlot[{1/2 x^2 < y < -x + 4}, {x, -4.5, 4.5}, {y, -2.5, 8.5}, MaxRecursion → 10];
ab = ContourPlot[{f[x, y] == f[-4, 8]}, {x, -12, 12}, {y, -12, 12}];
ab2 = ContourPlot[{f[x, y] == f[0, 0]}, {x, -12, 12}, {y, -12, 12}];
ac = Graphics[Point[{0, -1}]];
Show[aa, ab, ab2, ac, AspectRatio → Automatic, Axes → {True, True},
 PlotRange → {{-8.5, 8.5}, {-2.5, 9.5}},
 Ticks → {{1, -2}, {-2, 2}}]

Print[{f[0, 0], f[-4, 8]}]
```



{0, 96}

Integrale doppio – 1

```
f[x_, y_] := x * e^(2 y^2);
aa = RegionPlot[{4 y > x^2 && 2 > x > 0 && 0 < y < 1}, {x, -0.5, 2.5}, {y, -0.5, 1.5}, MaxRecursion → 10];
Show[aa, AspectRatio → Automatic, Axes → True,
 Ticks → {{-2, 1, 2}, {-2, 2}}]
```



$$\int_0^{\sqrt{4\,y}} f[x,\, y]\, dx$$

$$2\, e^{2 y^2}\, y$$

$$\int_0^1 \int_0^{\sqrt{4\,y}} f[x,\, y]\, dx\, dy$$

$$\frac{1}{2}\left(-1 + e^2\right)$$

Numeri complessi – 1

In[22]:= $\left\{\text{Abs}\left[\left(-i + \sqrt{3}\right)\right],\ \text{Arg}\left[\left(-i + \sqrt{3}\right)\right]\right\}$

Out[22]= $\left\{2,\ -\frac{\pi}{6}\right\}$

In[23]:= $\left\{\text{Abs}\left[\left(-i + \sqrt{3}\right)^8\right],\ \text{Arg}\left[\left(-i + \sqrt{3}\right)^8\right]\right\}$

Out[23]= $\left\{256,\ \frac{2\,\pi}{3}\right\}$

In[24]:= $\text{Solve}\left[z^4 == \left(-i + \sqrt{3}\right)^8,\ z\right]$

Out[24]= $\left\{\left\{z \to -2\ 2^{3/4}\left(-1 + i\sqrt{3}\right)^{1/4}\right\},\ \left\{z \to -2\, i\ 2^{3/4}\left(-1 + i\sqrt{3}\right)^{1/4}\right\},\ \left\{z \to 2\, i\ 2^{3/4}\left(-1 + i\sqrt{3}\right)^{1/4}\right\},\ \left\{z \to 2 \times 2^{3/4}\left(-1 + i\sqrt{3}\right)^{1/4}\right\}\right\}$

In[36]:= $\text{Print}\Big[\text{Table}\Big[\left\{\text{Abs}\left[\left(-i + \sqrt{3}\right)^8\right]^{\frac{1}{4}} * \text{Cos}\left[\frac{1}{4}\,\text{Arg}\left[\left(-i + \sqrt{3}\right)^8\right] + \frac{2\,k\,\pi}{4}\right],\ \text{Abs}\left[\left(-i + \sqrt{3}\right)^8\right]^{\frac{1}{4}} * \text{Sin}\left[\frac{1}{4}\,\text{Arg}\left[\left(-i + \sqrt{3}\right)^8\right] + \frac{2\,k\,\pi}{4}\right]\right\},\ \{k,\ 0,\ 4\}\Big]\Big]$

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

Matrici, autovalori – 1

In[33]:= $A = \frac{1}{4}\begin{pmatrix} 9 & -\sqrt{3} \\ -\sqrt{3} & 11 \end{pmatrix}$;

```
Print[Eigenvalues[A]]; Print[Orthogonalize[Eigenvectors[A]]]
```

{3, 2}

$\left\{\left\{-\frac{1}{2}, \frac{\sqrt{3}}{2}\right\}, \left\{\frac{\sqrt{3}}{2}, \frac{1}{2}\right\}\right\}$

In[35]:= $m = \begin{pmatrix} \frac{\sqrt{3}}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{pmatrix}$; `MatrixForm[Transpose[m].A.m]`

Out[35]//MatrixForm=

$\begin{pmatrix} 2 & 0 \\ 0 & 3 \end{pmatrix}$