versione 0

Equazioni differenziali – 0

```
Simplify[∫ 2/(x^2 + 2 x) dx]
```

Log[x] - Log[2 + x]

```
Simplify[DSolve[{
    y'[x] == (2 y[x])/(x^2 + 2 x) + x^2, y[-1] == 1
  }, y[x], x]]
```

$\{\{y[x] \to \frac{x\left(-5+3x^2+x^3\right)}{3\ (2+x)}\}\}$

Funzioni di due variabili, punti critici – 0

```
g[x_, y_] := -4 y - 8 x y - y^2 + 16 Log[x y];
f[x_, y_] := g[x, y]; Print[Expand[f[x, y]]];
grad = Simplify[{Together[D[f[x, y], x]], Together[D[f[x, y], y]]}]
```

$-4y - 8xy - y^2 + 16\,\mathrm{Log}[x\,y]$

$\{\frac{16}{x} - 8y,\ -4 - 8x + \frac{16}{y} - 2y\}$

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

x == -1 && y == -2

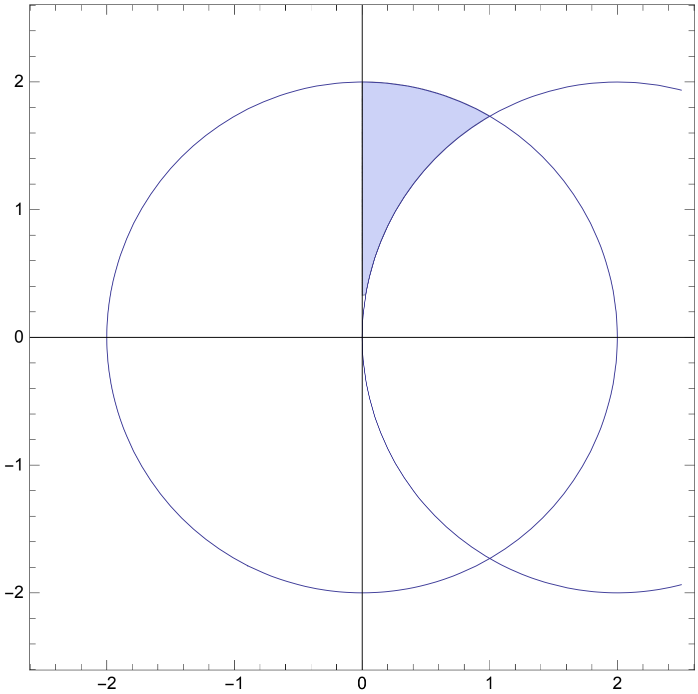
```
H[x_, y_] = {{D[f[x, y], x, x], D[f[x, y], x, y]}, {D[f[x, y], x, y], D[f[x, y], y, y]}};
H[x, y];
Print[MatrixForm[H[x, y]]];
Print[MatrixForm[H[-1, -2]]];
```

$$\begin{pmatrix} -\frac{16}{x^2} & -8 \\ -8 & -2-\frac{16}{y^2} \end{pmatrix}$$

$$\begin{pmatrix} -16 & -8 \\ -8 & -6 \end{pmatrix}$$

Integrale doppio – 0

```
f[x_, y_] := y;
aa = RegionPlot[{x^2 + y^2 < 4 && x^2 + y^2 - 4 x > 0 && x > 0 && y > 0},
   {x, -2.5, 2.5}, {y, -2.5, 2.5}, MaxRecursion → 10];
ab = ContourPlot[{4 == x^2 + y^2}, {x, -2.5, 2.5}, {y, -2.5, 2.5}];
ac = ContourPlot[{x^2 + y^2 - 4 x == 0}, {x, -2.5, 2.5}, {y, -2.5, 2.5}];
Show[aa, ab, ac, AspectRatio → Automatic, Axes → True,
 Ticks → {{-2, 1, 2}, {-2, 2}}]
```




```
Simplify[f[r Cos[t], r Sin[t]] * r]
```

$r^2 \, \text{Sin}[t]$

```
Simplify[∫_{4 Cos[t]}^{2} f[r Cos[t], r Sin[t]] * r ⅆr]
```

$\frac{8}{3}\left(1 - 8\,\text{Cos}[t]^3\right)\text{Sin}[t]$

$$\int_{\frac{\pi}{3}}^{\frac{\pi}{2}}\int_{4\,\text{Cos}[t]}^{2} \text{f}[r\,\text{Cos}[t],\, r\,\text{Sin}[t]] * r \, dr\, dt$$

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Altrimenti, senza passare a coordinate polari:

$$\int_{\sqrt{4x-x^2}}^{\sqrt{4-x^2}} \text{f}[x, y]\, dy$$

$2 - 2x$

$$\int_0^1\int_{\sqrt{4x-x^2}}^{\sqrt{4-x^2}} \text{f}[x, y]\, dy\, dx$$

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Numeri complessi

In[13]:= `Solve[z^2 == -3 ⅈ z*, z]`

Out[13]= $\left\{\{z \to 0\},\ \{z \to 3\,i\},\ \left\{z \to -\frac{3\,i}{2} - \frac{3\sqrt{3}}{2}\right\},\ \left\{z \to -\frac{3\,i}{2} + \frac{3\sqrt{3}}{2}\right\}\right\}$

In[14]:=
```
Solve[{
   x^2 - y^2 + 3 y == 0,
   2 x y + 3 x == 0
  }, {x, y}]
```

Out[14]= $\left\{\{x\to 0,\ y\to 0\},\ \{x\to 0,\ y\to 3\},\ \left\{x\to -\frac{3\sqrt{3}}{2},\ y\to -\frac{3}{2}\right\},\ \left\{x\to \frac{3\sqrt{3}}{2},\ y\to -\frac{3}{2}\right\}\right\}$

Matrici, autovalori

In[27]:=
```
v = (1 0 0 1); A = Transpose[v].v; MatrixForm[A]
```

Out[27]//MatrixForm=

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

In[28]:=
```
Print[Eigenvalues[A]];
Print[Orthogonalize[Eigenvectors[A]]]
```

{2, 0, 0, 0}

$\left\{\left\{-\frac{1}{\sqrt{2}},\ 0,\ 0,\ -\frac{1}{\sqrt{2}}\right\},\ \left\{-\frac{1}{\sqrt{2}},\ 0,\ 0,\ \frac{1}{\sqrt{2}}\right\},\ \{0,\ 0,\ 1,\ 0\},\ \{0,\ 1,\ 0,\ 0\}\right\}$