versione 0

Equazioni differenziali – 0

```
Simplify[DSolve[{
    y'[x] == x/(3 y[x] + 1)^3, y[4] == 1/3
  }, y[x], x]]
```

$\{\{y[x] \to \frac{1}{3}\left(-1+\left(-80+6x^2\right)^{1/4}\right)\}\}$

```
Reduce[-80 + 6 x^2 > 0, x, Reals]
```

$x < -2\sqrt{\frac{10}{3}} \;||\; x > 2\sqrt{\frac{10}{3}}$

Funzioni di due variabili, punti critici – 0

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

$e^{x^2-y} + 4x + y$

$\{4 + 2 e^{x^2-y} x,\ 1 - e^{x^2-y}\}$

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

$x == -2 \;\&\&\; y == 4$

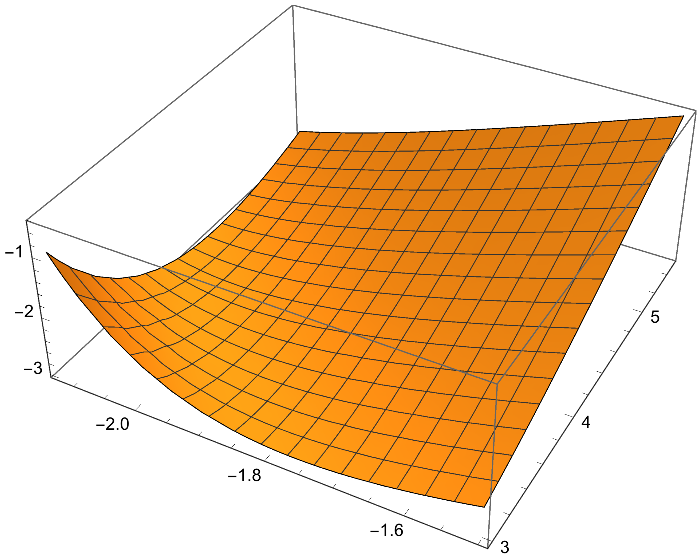
```
H[x_, y_] = {{D[f[x, y], x, x], D[f[x, y], x, y]}, {D[f[x, y], x, y], D[f[x, y], y, y]}};
H[x, y];
Print[MatrixForm[H[x, y]]];
```

$\begin{pmatrix} 2 e^{x^2-y} + 4 e^{x^2-y} x^2 & -2 e^{x^2-y} x \\ -2 e^{x^2-y} x & e^{x^2-y} \end{pmatrix}$

```
Print[{MatrixForm[H[-2, 4]]}];
```

$\left\{\begin{pmatrix} 18 & 4 \\ 4 & 1 \end{pmatrix}\right\}$

```
a = .5; Plot3D[f[x, y], {x, -2 - a / 4, -2 + a}, {y, 4 - 2 a, 4 + 3 a}]
```



Integrale doppio – 0

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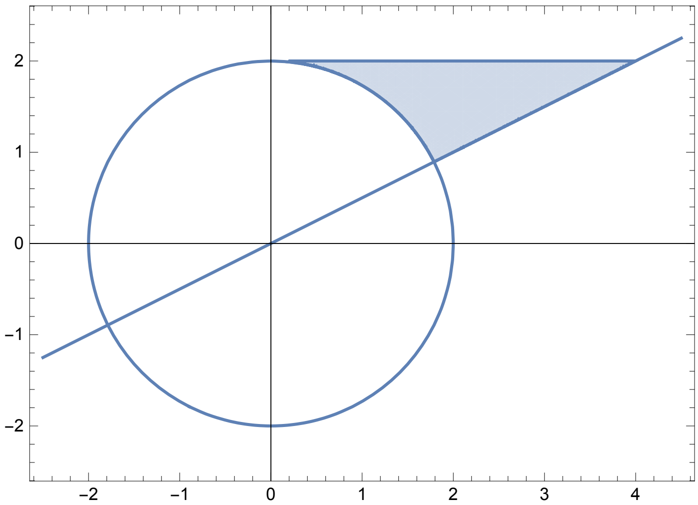
```
f[x_, y_] := y;
aa = RegionPlot[{x^2 + y^2 > 4 && 1/2 x < y < 2 && x > 0},
   {x, -2.5, 4.5}, {y, -2.5, 2.5}, MaxRecursion → 10];
ab = ContourPlot[{4 == x^2 + y^2}, {x, -2.5, 2.5}, {y, -2.5, 2.5}];
ac = Plot[x / 2, {x, -2.5, 4.5}];
Show[aa, ab, ac, AspectRatio → Automatic, Axes → True,
 Ticks → {{-2, 1, 2}, {-2, 2}}]
```




```
Simplify[f[r Cos[t], r Sin[t]] * r, r > 0]
```

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

$$\text{Simplify}\left[\int_2^{2/\text{Sin}[t]} f[r \text{Cos}[t], r \text{Sin}[t]] * r \, dr, r > 0\right]$$

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

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

$$\frac{8 \text{Cos}[t]}{3} - \frac{8 \text{Cot}[t]}{3}$$

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \int_2^{2/\text{Sin}[t]} f[r \text{Cos}[t], r \text{Sin}[t]] * r \, dr \, dt$$

$$\frac{4}{\sqrt{3}}$$

Numeri complessi – 0

$$\text{Simplify}\left[\frac{(2 i)^7}{(1 + i)^2}\right]$$

-64

$$\text{Solve}\left[z^5 z^* == \frac{(2 i)^7}{(1 + i)^2}, z\right]$$

$$\{\{z \to (-1 - i)\sqrt{2}\}, \{z \to (-1 + i)\sqrt{2}\}, \{z \to (1 - i)\sqrt{2}\}, \{z \to (1 + i)\sqrt{2}\}\}$$

Matrici, autovalori – 0

In[34]:=
```
Clear[a]; Clear[b]; Clear[c];
```

In[35]:= $A = \begin{pmatrix} 2 & -3 & 2 \\ 1 & -2 & 2 \\ 1 & -3 & k \end{pmatrix}$; $\begin{pmatrix} a \\ b \\ c \end{pmatrix}$;

Solve$\left[A.\begin{pmatrix} a \\ b \\ c \end{pmatrix} == \begin{pmatrix} a \\ b \\ c \end{pmatrix}, \{b, c\}\right]$

Out[36]= $\left\{\left\{b \to \frac{a}{3}, c \to 0\right\}\right\}$

Eigenvalues[A]

$\left\{1, \frac{1}{2}\left(-1 + k - \sqrt{-15 + 2k + k^2}\right), \frac{1}{2}\left(-1 + k + \sqrt{-15 + 2k + k^2}\right)\right\}$

Eigenvectors[A]

$\left\{\{3, 1, 0\}, \left\{-\frac{3 - k - \sqrt{-15 + 2k + k^2}}{3 - k + \sqrt{-15 + 2k + k^2}}, -\frac{3 - k - \sqrt{-15 + 2k + k^2}}{3 - k + \sqrt{-15 + 2k + k^2}}, 1\right\},\right.$
$\left.\left\{-\frac{-3 + k - \sqrt{-15 + 2k + k^2}}{-3 + k + \sqrt{-15 + 2k + k^2}}, -\frac{-3 + k - \sqrt{-15 + 2k + k^2}}{-3 + k + \sqrt{-15 + 2k + k^2}}, 1\right\}\right\}$

Reduce$\left[-15 + 2k + k^2 > 0, k\right]$

k < -5 || k > 3

$A = \begin{pmatrix} 2 & -3 & 2 \\ 1 & -2 & 2 \\ 1 & -3 & 3 \end{pmatrix}$; $\begin{pmatrix} a \\ b \\ c \end{pmatrix}$;

Solve$\left[A.\begin{pmatrix} a \\ b \\ c \end{pmatrix} == \begin{pmatrix} a \\ b \\ c \end{pmatrix}, \{b, c\}\right]$

Solve::svars : Equations may not give solutions for all "solve" variables. ≫

$\left\{\left\{c \to -\frac{a}{2} + \frac{3b}{2}\right\}\right\}$

Eigenvectors[A]

{{-2, 0, 1}, {3, 1, 0}, {0, 0, 0}}

Eigenvalues[A]

{1, 1, 1}

$A = \begin{pmatrix} 2 & -3 & 2 \\ 1 & -2 & 2 \\ 1 & -3 & -5 \end{pmatrix}$; **Eigenvalues[A]**

{-3, -3, 1}

Eigenvectors[A]

{{-1, -1, 1}, {0, 0, 0}, {3, 1, 0}}