versione 0

Equazioni differenziali – 0

```
DSolve[{y'[x] == x y[x]^3/(x^2 + 1), y[0] == -1/2},
 y[x], x]
```

Solve::ifun :
  Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. >>

DSolve::bvnul :
  For some branches of the general solution, the given boundary conditions lead to an empty solution. >>

$$\left\{\left\{y[x] \to -\frac{1}{\sqrt{4 - \text{Log}\left[1 + x^2\right]}}\right\}\right\}$$

```
Solve[4 - Log[1 + x^2] == 0, x]
```

$$\left\{\left\{x \to -\sqrt{-1 + e^4}\right\}, \left\{x \to \sqrt{-1 + e^4}\right\}\right\}$$

Funzioni di due variabili, punti critici – 0

```
g[x_, y_] := 12 x + 3 x^2 - 2 x^3/3 + 12 x y - 18 y^2
```

```
f[x_, y_] := -3 / 2 g[2 y, x]; Expand[f[x, y]]
```

$$27 x^2 - 36 y - 36 x y - 18 y^2 + 8 y^3$$

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

$$\left\{54 x - 36 y, -36 - 36 x - 36 y + 24 y^2\right\}$$

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

$$\left\{\left\{x \to -\frac{1}{3}, y \to -\frac{1}{2}\right\}, \{x \to 2, y \to 3\}\right\}$$

```
H[x_, y_] = ( ∂x,x f[x, y]  ∂x,y f[x, y]
              ∂y,x f[x, y]  ∂y,y f[x, y] );
MatrixForm[H[x, y]]
```

$$\begin{pmatrix} 54 & -36 \\ -36 & -\frac{3}{2}(24 - 32 y) \end{pmatrix}$$

```
MatrixForm[H[-1/3, -1/2]]
```

$$\begin{pmatrix} 54 & -36 \\ -36 & -60 \end{pmatrix}$$

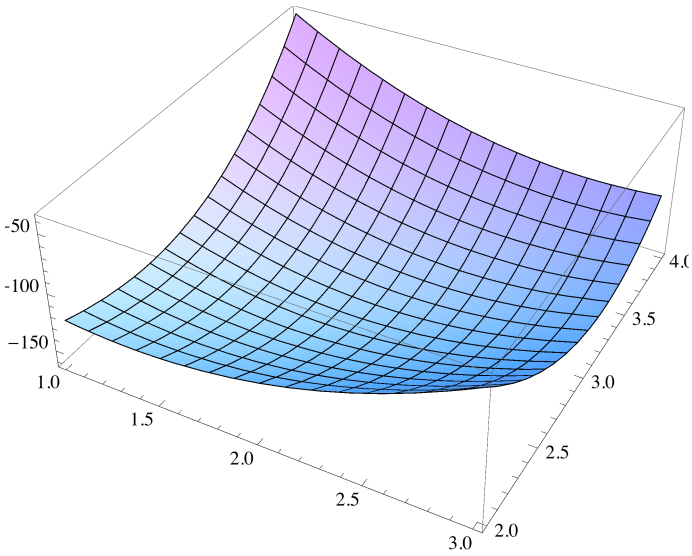
```
MatrixForm[H[2, 3]]
```

$$\begin{pmatrix} 54 & -36 \\ -36 & 108 \end{pmatrix}$$

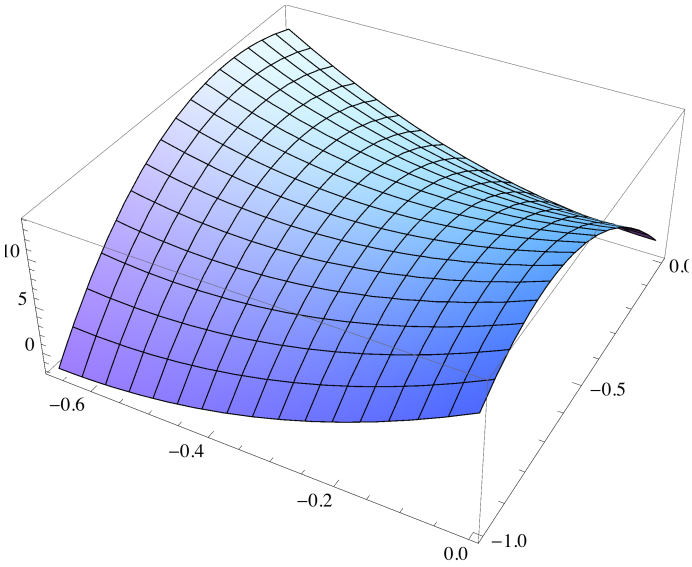
```
Det[%]
```

```
4536
```

```
Plot3D[f[x, y], {x, 1, 3}, {y, 2, 4}]
```




```
Plot3D[f[x, y], {x, -2 / 3, 0}, {y, -1, 0}]
```

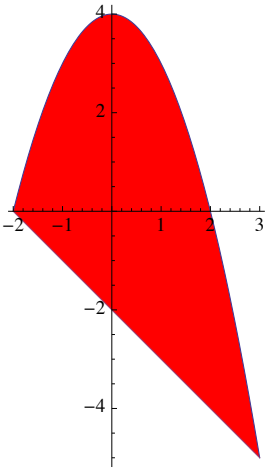


Integrale doppio – 0

```
Solve[-x^2 + 4 == -2 - x, x]
```

```
{{x → -2}, {x → 3}}
```

```
aa = Plot[{-x^2 + 4, -2 - x}, {x, -2, 3},
    Filling → {1 → {{2}, Red}}, AspectRatio → Automatic,
    Axes -> False];
Show[aa, Axes → True, AxesOrigin → {0, 0}]
```




```
f[x_, y_] := x * ℯ^y;
```

$$\text{Print}\left[\int_{-2-x}^{4-x^2} f[x, y]\, dy\right];$$

$$\text{Print}\left[\int_{-2}^{3}\int_{-2-x}^{4-x^2} f[x, y]\, dy\, dx\right]$$

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

$$\frac{3}{2} + \frac{7}{2\, e^5}$$

Numeri complessi – 0

```
z = ℯ^(i π/6) / (1 + i)^2; Print[{Re[z], Im[z], Abs[z], Arg[z]}]
```

$$\left\{\frac{1}{4}, -\frac{\sqrt{3}}{4}, \frac{1}{2}, -\frac{\pi}{3}\right\}$$

```
Print[{Abs[1/z], Arg[1/z]}]
```

$$\left\{2, \frac{\pi}{3}\right\}$$

Matrici, autovalori – 0

```
aa = {{1, a, 3}, {a, 3, c}, {3, c, 1}}; v = {{1}, {1}, {1}}; MatrixForm[aa.v]
```

$$\begin{pmatrix} 4 + a \\ 3 + a + c \\ 4 + c \end{pmatrix}$$

```
Solve[{4 + a == 3 + a + c, 4 + a == 4 + c}, {a, c}]
```

```
{{a → 1, c → 1}}
```

```
a = 1; c = 1; MatrixForm[aa]
```

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

```
Eigenvalues[aa]
```

```
{5, -2, 2}
```

```
Eigenvectors[aa]
```

```
{{1, 1, 1}, {-1, 0, 1}, {1, -2, 1}}
```

```
Orthogonalize[Eigenvectors[aa]]
```

$$\left\{\left\{\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right\}, \left\{-\frac{1}{\sqrt{2}}, 0, \frac{1}{\sqrt{2}}\right\}, \left\{\frac{1}{\sqrt{6}}, -\sqrt{\frac{2}{3}}, \frac{1}{\sqrt{6}}\right\}\right\}$$