versione 0

Equazioni differenziali – 0

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

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

$$\left\{\left\{y[x] \to \frac{1}{\sqrt{1 + \text{Log}[3] - \text{Log}[-1 + x^2]}}\right\}\right\}$$

```
Solve[1 + Log[3] - Log[-1 + x^2] == 0, x]
```

$$\left\{\left\{x \to -\sqrt{1 + 3\,e}\right\}, \left\{x \to \sqrt{1 + 3\,e}\right\}\right\}$$

Funzioni di due variabili, punti critici – 0

```
g[x_, t_] := 5 Log[t] - 3 x;
f[x_, y_] := g[x, 1 + x^2 + y^2]; f[x, y]
Print[Expand[f[x, y]]];
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]]]];
```

$$-3x + 5\,\text{Log}[1 + x^2 + y^2]$$

$$-3x + 5\,\text{Log}[1 + x^2 + y^2]$$

$$\left\{-3 + \frac{10x}{1 + x^2 + y^2}, \frac{10y}{1 + x^2 + y^2}\right\}$$

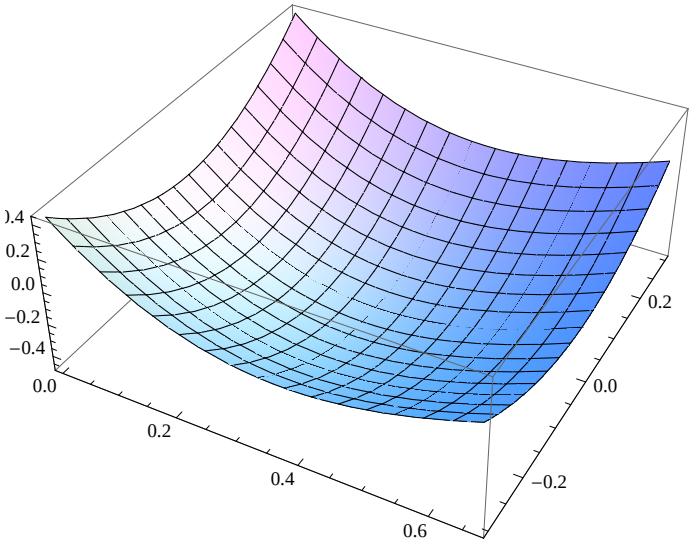
$$\left\{\left\{x \to \frac{1}{3}, y \to 0\right\}, \{x \to 3, y \to 0\}\right\}$$

$$\begin{pmatrix} -\frac{10\left(-1+x^2-y^2\right)}{\left(1+x^2+y^2\right)^2} & -\frac{20xy}{\left(1+x^2+y^2\right)^2} \\ -\frac{20xy}{\left(1+x^2+y^2\right)^2} & \frac{10\left(1+x^2-y^2\right)}{\left(1+x^2+y^2\right)^2} \end{pmatrix}$$

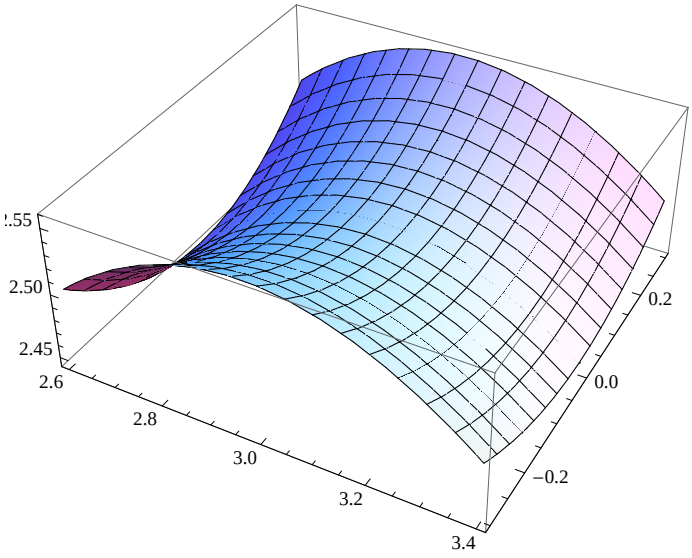
```
{MatrixForm[H[1/3, 0]], MatrixForm[H[3, 0]]}
```

$$\left\{\begin{pmatrix} \frac{36}{5} & 0 \\ 0 & 9 \end{pmatrix}, \begin{pmatrix} -\frac{4}{5} & 0 \\ 0 & 1 \end{pmatrix}\right\}$$

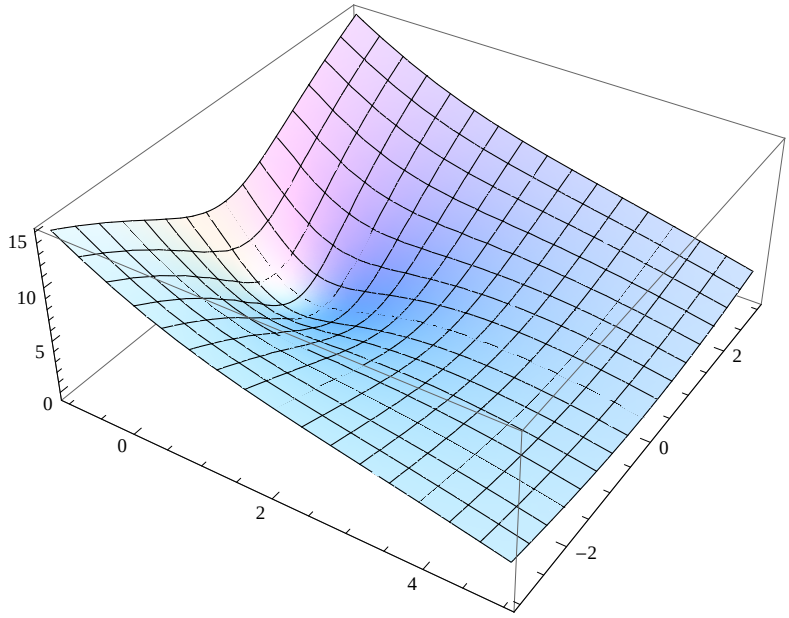
```
Plot3D[f[x, y], {x, 0, 2 / 3}, {y, -.3, .3}]
```




```
Plot3D[f[x, y], {x, 2.6, 3.4}, {y, -.3, .3}]
```



```
Plot3D[f[x, y], {x, -1, 5}, {y, -3, 3}]
```



Integrale doppio – 0

```
f[x_, y_] := x Log[1 + x^2 + y^2];
g[r_, t_] := r f[r Cos[t], r Sin[t]]; Simplify[g[r, t]]
```

$$r^2 \cos[t] \log\left[1 + r^2\right]$$

```
∫g[r, t] dr
```

$$\cos[t] \left(\frac{2\,r}{3} - \frac{2\,r^3}{9} - \frac{2 \arctan[r]}{3} + \frac{1}{3} r^3 \log\left[1 + r^2\right]\right)$$

```
Apart[r^3/(1 + r^2)]
```

$$r - \frac{r}{1 + r^2}$$

```
Print[Simplify[{∫_(-π/2)^(π/2) g[r, t] dt,
    ∫_0^Sqrt[3] ∫_(-π/2)^(π/2) g[r, t] dt dr}]];
```

$$\left\{2 r^2 \log\left[1 + r^2\right], -\frac{4\,\pi}{9} + \sqrt{3}\, \log[16]\right\}$$

Numeri complessi – 0

```
z = e^(π/4 i)/(Sqrt[2] + i Sqrt[2])^2; {Re[z], Im[z]}
```

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

```
Abs[1 / z]
```

```
4
```

```
Arg[1 / z]
```

$$\frac{\pi}{4}$$

Matrici, autovalori – 0

```
a = {{1, k, 3}, {1, 2, 0}, {3, el, 1}}; MatrixForm[a];
```

```
x = {{0}, {1}, {0}}; MatrixForm[a.x]
```

$$\begin{pmatrix} k \\ 2 \\ el \end{pmatrix}$$

```
k = 0; el = 0; MatrixForm[a]
```

$$\begin{pmatrix} 1 & 0 & 3 \\ 1 & 2 & 0 \\ 3 & 0 & 1 \end{pmatrix}$$

```
Eigenvalues[a]
```

```
{4, -2, 2}
```

```
Eigenvectors[a]
```

```
{{2, 1, 2}, {-4, 1, 4}, {0, 1, 0}}
```