

versione 0

Equazioni differenziali – 0

```
DSolve[{3 y''[x] + 2 y'[x] - 8 y[x] == 100 e^{-2 x}, y[0] == 5, y'[0] == 10},
  y[x], x]
{{y[x] -> e^{-2 x} (-4 + 9 e^{10 x/3} - 10 x)}}
```

Funzioni di due variabili, punti critici – 0

```
g[x_, y_] := 3 x^2 - \frac{2 x^3}{3} - 4 x y + 2 y^2;
f[x_, y_] := \frac{3}{2} g[2 x - 1, 3 x + 4 y]; Print[Expand[f[x, y]]];
grad = Expand[{D_x f[x, y], D_y f[x, y]}];
Print[grad];
Print[Solve[grad == {0, 0}, {x, y}]];
H[x_, y_] = {{D_{x,x} f[x, y], D_{x,y} f[x, y]}, {D_{y,x} f[x, y], D_{y,y} f[x, y]}};
Print[Simplify[MatrixForm[H[x, y]]]];
Print[Simplify[MatrixForm[H[\frac{1}{2}, -\frac{3}{8}]]]];
Print[Simplify[MatrixForm[H[1, -\frac{1}{2}]]]];
Plot3D[f[x, y], {x, -1, 1}, {y, -1, 1}]
Null
```

$$\frac{11}{2} - 6x + 21x^2 - 8x^3 + 24y + 24xy + 48y^2$$

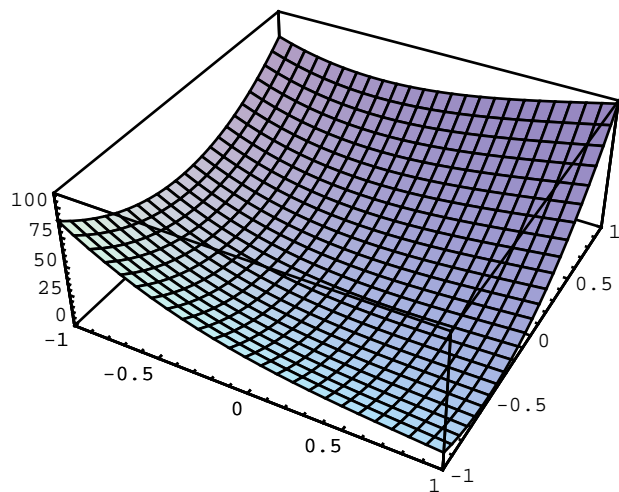
$$\{-6 + 42x - 24x^2 + 24y, 24 + 24x + 96y\}$$

$$\left\{ \left\{ y \rightarrow -\frac{1}{2}, x \rightarrow 1 \right\}, \left\{ y \rightarrow -\frac{3}{8}, x \rightarrow \frac{1}{2} \right\} \right\}$$

$$\begin{pmatrix} 42 - 48x & 24 \\ 24 & 96 \end{pmatrix}$$

$$\begin{pmatrix} 18 & 24 \\ 24 & 96 \end{pmatrix}$$

$$\begin{pmatrix} -6 & 24 \\ 24 & 96 \end{pmatrix}$$



Integrale doppio – 0

$$f[x_, y_] := \frac{3 e^{2x}}{\sqrt{2 - 3y + y^3}};$$

$$\text{Simplify}\left[\left\{\int_0^{\text{Log}[y]} f[x, y] dx, \int_1^e \int_0^{\text{Log}[y]} f[x, y] dx dy\right\}\right]$$

$$\left\{\frac{3(-1 + y^2)}{2\sqrt{2 - 3y + y^3}}, (-1 + e)\sqrt{2 + e}\right\}$$

Numeri complessi – 0

$$\text{Solve}[z^2 + 6z + 9 - 18i == 0, z]$$

$$\{\{z \rightarrow -6 - 3i\}, \{z \rightarrow 3i\}\}$$

$$\text{Simplify}\left[\left\{\frac{-6 - 3i}{3i}, 1 / \left(\frac{-6 - 3i}{3i}\right)\right\}\right]$$

$$\{-1 + 2i, -\frac{1}{5} - \frac{2i}{5}\}$$

Matrici, autovalori – 0

$$a = \begin{pmatrix} 0 & 2 & 0 \\ 0 & 0 & -2 \\ -2 & 0 & 0 \end{pmatrix}; \text{MatrixForm}[a.\text{Transpose}[a]]$$

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

Eigenvalues[a]

$$\{2, -2(-1)^{1/3}, 2(-1)^{2/3}\}$$

Re[%]

$$\{2, -1, -1\}$$

Im[%%]

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

Eigenvectors[a]

$$\{\{-1, -1, 1\}, \left\{\frac{1}{2}(1 - i\sqrt{3}), 1 + \frac{1}{2}(-1 + i\sqrt{3}), 1\right\}, \left\{\frac{1}{2}(1 + i\sqrt{3}), 1 + \frac{1}{2}(-1 - i\sqrt{3}), 1\right\}\}$$

versione 1

Equazioni differenziali – 1

```
DSolve[{8 y''[x] + 2 y'[x] - 3 y[x] == 100 e^(1/2 x), y[0] == 5, y'[0] == 10},
  y[x], x]
{{Y[x] -> e^(-3 x/4) (2 + 3 e^(5 x/4) + 10 e^(5 x/4) x)}}
```

Funzioni di due variabili, punti critici – 1

```
g[x_, y_] := 3 x^2 - (2 x^3)/3 - 4 x y + 2 y^2;
f[x_, y_] := (3/2) g[2 x - 3, 3 x + 4 y - 1]; Print[Expand[f[x, y]]];
grad = Expand[{D_x f[x, y], D_y f[x, y]}];
Print[grad];
Print[Solve[grad == {0, 0}, {x, y}]];
H[x_, y_] = {{D_xx f[x, y], D_xy f[x, y]}, {D_yx f[x, y], D_yy f[x, y]}};
Print[Simplify[MatrixForm[H[x, y]]]];
Print[Simplify[MatrixForm[H[3/2, -7/8]]]];
Print[Simplify[MatrixForm[H[2, -1]]]];
Plot3D[f[x, y], {x, 1.4, 1.6}, {y, -0.89, -0.86}];
Plot3D[f[x, y], {x, 1.5, 2.5}, {y, -0.1, 0.5}, -0.5}];
Null
```

$$\frac{105}{2} - 60x + 45x^2 - 8x^3 + 48y + 24xy + 48y^2$$

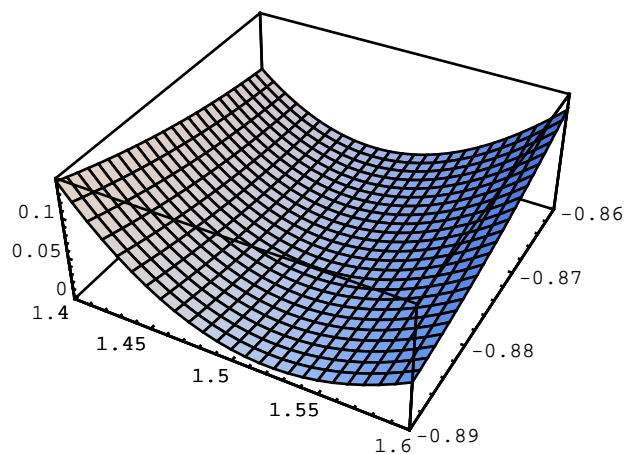
$$\{-60 + 90x - 24x^2 + 24y, 48 + 24x + 96y\}$$

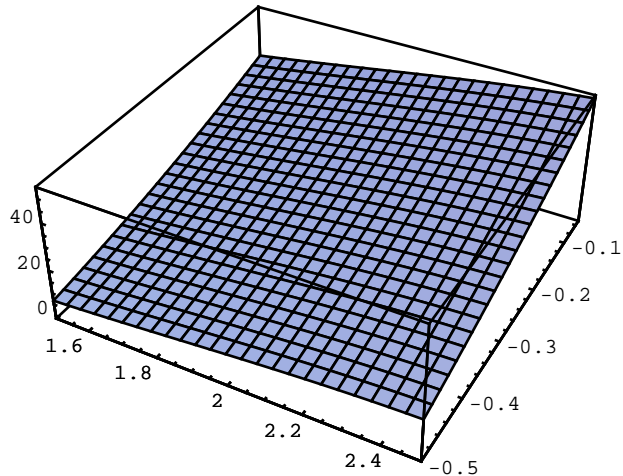
$$\left\{ \left\{ y \rightarrow -1, x \rightarrow 2 \right\}, \left\{ y \rightarrow -\frac{7}{8}, x \rightarrow \frac{3}{2} \right\} \right\}$$

$$\begin{pmatrix} 90 - 48x & 24 \\ 24 & 96 \end{pmatrix}$$

$$\begin{pmatrix} 18 & 24 \\ 24 & 96 \end{pmatrix}$$

$$\begin{pmatrix} -6 & 24 \\ 24 & 96 \end{pmatrix}$$





Integrale doppio – 1

$$f[x_, y_] := \frac{3 e^{3x}}{\sqrt{8 - 4y + y^4}};$$

$$\text{Simplify}\left[\left\{\int_0^{\text{Log}[y]} f[x, y] dx,\right.\right. \\ \left.\left.\int_1^e \int_0^{\text{Log}[y]} f[x, y] dx dy\right\}\right]$$

$$\left\{\frac{-1 + y^3}{\sqrt{8 - 4y + y^4}}, \frac{1}{2} \left(-\sqrt{5} + \sqrt{8 - 4e + e^4}\right)\right\}$$

Numeri complessi – 0

$$\text{Solve}[z^2 - 4z + 4 - 8i == 0, z]$$

$$\{\{z \rightarrow -2i\}, \{z \rightarrow 4 + 2i\}\}$$

$$\text{Simplify}\left[\left\{\frac{-2i}{4 + 2i}, 1 / \left(\frac{-2i}{4 + 2i}\right)\right\}\right]$$

$$\left\{-\frac{1}{5} - \frac{2i}{5}, -1 + 2i\right\}$$

Matrici, autovalori – 0

$$a = \begin{pmatrix} 0 & -4 & 0 \\ 0 & 0 & 4 \\ -4 & 0 & 0 \end{pmatrix}; \text{MatrixForm}[a.\text{Transpose}[a]]$$

$$\begin{pmatrix} 16 & 0 & 0 \\ 0 & 16 & 0 \\ 0 & 0 & 16 \end{pmatrix}$$

$$\text{Eigenvalues}[a]$$

$$\{4, -4(-1)^{1/3}, 4(-1)^{2/3}\}$$

$$\text{Re}[\%]$$

$$\{4, -2, -2\}$$

Im[%%]

$$\{0, -2\sqrt{3}, 2\sqrt{3}\}$$

Eigenvectors[a]

$$\left\{ \{-1, 1, 1\}, \left\{ \frac{1}{4} (2 - 2i\sqrt{3}), -1 + \frac{1}{4} (2 - 2i\sqrt{3}), 1 \right\}, \left\{ \frac{1}{4} (2 + 2i\sqrt{3}), -1 + \frac{1}{4} (2 + 2i\sqrt{3}), 1 \right\} \right\}$$