versione 0

Equazioni differenziali – 0

```
DSolve[{3 y''[x] + y'[x] == 20 x e^-x, y[0] == 6, y'[0] == 2},
 y[x], x]
```

$$\{\{y[x] \to e^{-x}\left(25 - 51\, e^{2x/3} + 32\, e^{x} + 10\, x\right)\}\}$$

Funzioni di due variabili, punti critici – 0

In[1]:=

```
f[x_, y_] := (9 x^2 - y^2) Log[x]
Expand[f[x, y]]
```

Out[2]= $9\,x^2\,\text{Log}[x] - y^2\,\text{Log}[x]$

In[3]:= `grad = Simplify[{Together[D[f[x, y], x]], Together[D[f[x, y], y]]}]`

Out[3]= $\left\{9\,x - \frac{y^2}{x} + 18\,x\,\text{Log}[x],\ -2\,y\,\text{Log}[x]\right\}$

In[4]:= `Reduce[grad == {0, 0}, {x, y}]`

Out[4]= $(x == 1 \&\& (y == -3 \,||\, y == 3)) \,||\, \left(x == \frac{1}{\sqrt{e}} \&\& y == 0\right)$

In[5]:=

```
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]]];
```

$$\begin{pmatrix} 36 - \frac{9x^2 - y^2}{x^2} + 18\,\text{Log}[x] & -\frac{2y}{x} \\ -\frac{2y}{x} & -2\,\text{Log}[x] \end{pmatrix}$$

In[7]:= `Print[{MatrixForm[H[1, -3]], MatrixForm[H[1, 3]], MatrixForm[H[1/Sqrt[e], 0]]}];`

$$\left\{\begin{pmatrix} 36 & 6 \\ 6 & 0 \end{pmatrix}, \begin{pmatrix} 36 & -6 \\ -6 & 0 \end{pmatrix}, \begin{pmatrix} 18 & 0 \\ 0 & 1 \end{pmatrix}\right\}$$

Integrale doppio – 0

```
f[x_, y_] := y / Cos[x y]^2;
Print[Assuming[1 < y < π/3 && 1 < x < π/3, ∫_1^(π/(3 y)) f[x, y] dx]];
Print[∫_1^(π/3) ∫_1^(π/(3 y)) f[x, y] dx dy]
```

$\sqrt{3} - \text{Tan}[y]$

$\frac{-3 + \pi}{\sqrt{3}} + \text{Log}[\text{Csc}[2]\,\text{Sin}[1]]$

Numeri complessi – 0

```
zz = 1 + i
```

$1 + i$

```
Abs[zz]
```

$$\sqrt{2}$$

```
Arg[zz]
```

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

```
w1 = ∜2 e^(i π/8); w2 = -w1; Print[{w1, w2}]
```

$$\left\{2^{1/4}\, e^{\frac{i\pi}{8}},\ -2^{1/4}\, e^{\frac{i\pi}{8}}\right\}$$

```
Print[
 Simplify[{{Re[e^(3 i π/8) * 1 / w1], Im[e^(3 i π/8) * 1 / w1]}, {Re[e^(3 i π/8) * 1 / w2], Im[e^(3 i π/8) * 1 / w2]}}]]
```

$$\left\{\left\{\frac{1}{2^{3/4}},\ \frac{1}{2^{3/4}}\right\},\ \left\{-\frac{1}{2^{3/4}},\ -\frac{1}{2^{3/4}}\right\}\right\}$$

Matrici, autovalori – 0

```
a[k_, h_] := {{1, k, 1}, {h, 1, 1}, {1, 1, 0}}; Print[MatrixForm[a[k, h]]];
v = {{1}, {1}, {1}}; Print[MatrixForm[v]];
Print[MatrixForm[a[k, h].v]];
Solve[{(a[k, h].v)[[1]] == (a[k, h].v)[[2]], (a[k, h].v)[[1]] == (a[k, h].v)[[3]]}, {h, k}]
```

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

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

$$\begin{pmatrix} 2+k \\ 2+h \\ 2 \end{pmatrix}$$

$$\{\{h \to 0,\ k \to 0\}\}$$

```
b = a[0, 0]; MatrixForm[b]
```

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

```
Eigenvalues[b]
```

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

```
Eigenvectors[b]
```

$$\{\{1, 1, 1\}, \{-1, -1, 2\}, \{-1, 1, 0\}\}$$

```
Orthogonalize[%]
```

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