versione 0

Equazioni differenziali – 0

```
Simplify[DSolve[{
    y''[x] + 4 y'[x] == 64 x e^(-4 x),
    y[0] == 0, y'[0] == 4
  }, y[x], x]]
```

$$\{\{y[x] \to 2\, e^{-4x}\left(-1 + e^{4x} - 2x - 4x^2\right)\}\}$$

Funzioni di due variabili, punti critici – 0

```
g[x_, y_] := x^2 * e^(2 x - y^2);
f[x_, y_] := g[x, y]; Print[f[x, y]];
grad = Simplify[{Together[D[f[x, y], x]], Together[D[f[x, y], y]]}]
```

$$e^{2x-y^2}\, x^2$$

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

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

$$(x == -1 \&\& y == 0)\ ||\ x == 0$$

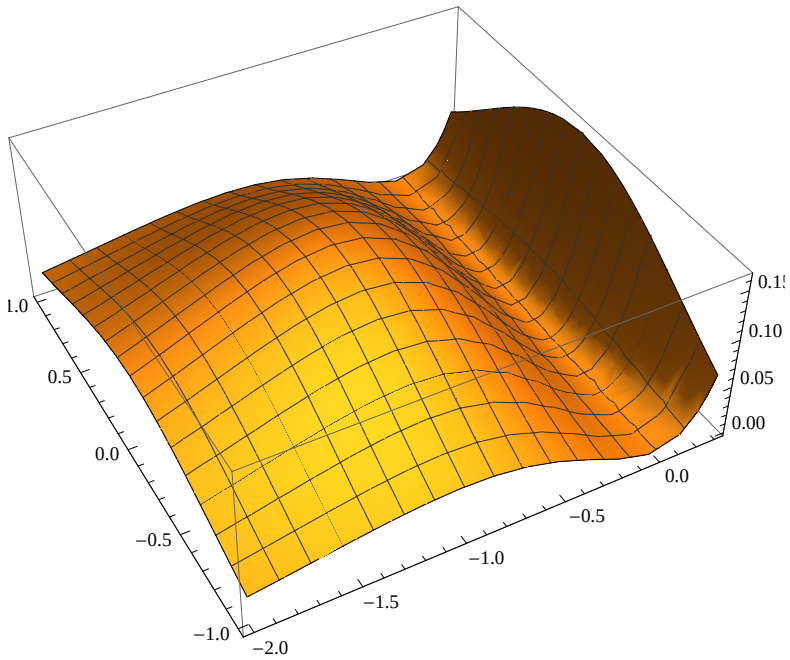
```
H[x_, y_] = {{D[f[x, y], x, x], D[f[x, y], x, y]}, {D[f[x, y], x, y], D[f[x, y], y, y]}}; H[x, y];
Print[Simplify[MatrixForm[H[x, y]]]];
```

$$\begin{pmatrix} 2\, e^{2x-y^2}\left(1 + 4x + 2x^2\right) & -4\, e^{2x-y^2}\, x\,(1+x)\, y \\ -4\, e^{2x-y^2}\, x\,(1+x)\, y & 2\, e^{2x-y^2}\, x^2\left(-1 + 2y^2\right) \end{pmatrix}$$

```
Print[{MatrixForm[H[-1, 0]]}];
```

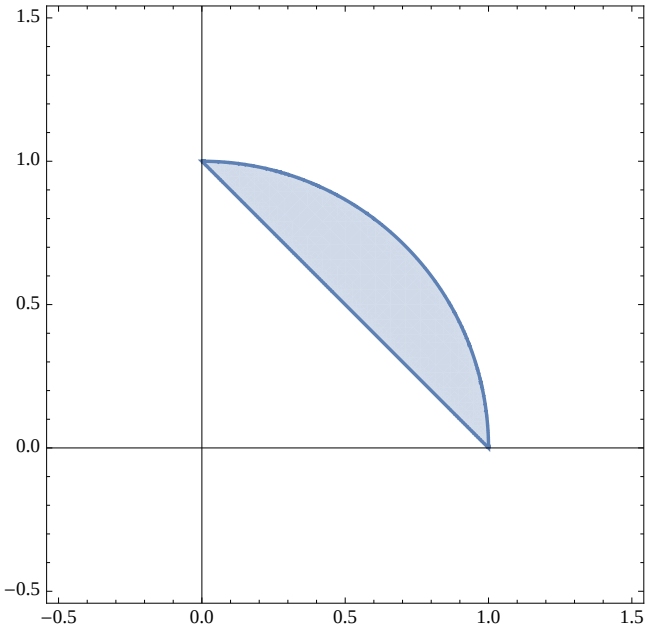
$$\left\{\begin{pmatrix} -\frac{2}{e^2} & 0 \\ 0 & -\frac{2}{e^2} \end{pmatrix}\right\}$$

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



Integrale doppio – 0

```
f[x_, y_] := (x + y)/(x^2 + y^2);
aa = RegionPlot[{x + y ≥ 1 && x^2 + y^2 ≤ 1}, {x, -0.5, 1.5}, {y, -0.5, 1.5}, MaxRecursion → 10];
Show[aa, AspectRatio → Automatic, Axes → True,
 Ticks → {{1}, {1}}]
```




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

```
Cos[t] + Sin[t]
```

```
Simplify[∫_(1/(Cos[t]+Sin[t]))^1 r * f[r Cos[t], r Sin[t]] dr]
```

```
-1 + Cos[t] + Sin[t]
```

$$\int_0^{\frac{\pi}{2}} \int_{\frac{1}{\text{Cos}[t]+\text{Sin}[t]}}^{1} r * f[r\,\text{Cos}[t], r\,\text{Sin}[t]]\, dr\, dt$$

$$2 - \frac{\pi}{2}$$

Numeri complessi – 0 da fare

In[1]:=
```
Solve[z^2 - (4 + 2 i) z + 11 + 10 i == 0, z]
```

Out[1]=
```
{{z → 1 + 4 i}, {z → 3 - 2 i}}
```

In[2]:=
```
Δ = (4 + 2 i)^2 - 4 * (11 + 10 i); Expand[Δ]
```

Out[2]=
```
-32 - 24 i
```

In[3]:=
```
Abs[Δ]
```

Out[3]=
```
40
```

In[5]:=
```
Cos[Arg[Δ]]
```

Out[5]=
$$-\frac{4}{5}$$

In[7]:=
```
Solve[p^2 == Δ, p]
```

Out[7]=
```
{{p → -2 + 6 i}, {p → 2 - 6 i}}
```

Matrici, autovalori – 0 da fare

In[8]:=
$$A = \begin{pmatrix} 0 & 0 & 1 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix};$$

```
Print[Eigenvalues[A]]; Print[Eigenvectors[A]]
```

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

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

In[10]:=
```
v = {x, y, z}; MatrixForm[v]
```

Out[10]//MatrixForm=
$$\begin{pmatrix} x \\ y \\ z \end{pmatrix}$$

In[11]:=
```
Solve[A.v == {0, 0, 0}, v]
```

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

Out[11]=
```
{{x → 0, z → 0}}
```

In[12]:=
$$\text{Expand}\left[\text{Det}\left[\begin{pmatrix} 0 & x & 1 \\ 0 & y & 1 \\ 1 & z & 0 \end{pmatrix}\right]\right]$$

Out[12]=
$$x - y$$