versione 0

Equazioni differenziali – 0

```
Simplify[DSolve[{
    2 y''[x] + y'[x] == 6 + 10 Sin[x],
    y[0] == -2, y'[0] == 0
  }, y[x], x]]
```

$$\left\{\left\{y[x] \to -4 + 4\, e^{-x/2} + 6x - 2\cos[x] - 4\sin[x]\right\}\right\}$$

Funzioni di due variabili, punti critici – 0

```
g[x_, y_] := x^2 * e^(-x+y^2);
f[x_, y_] := 1/4 g[2 x, y]; Expand[f[x, y]];
Print[f[x, y]];
grad = Expand[{D[f[x, y], x], D[f[x, y], 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]]]]
```

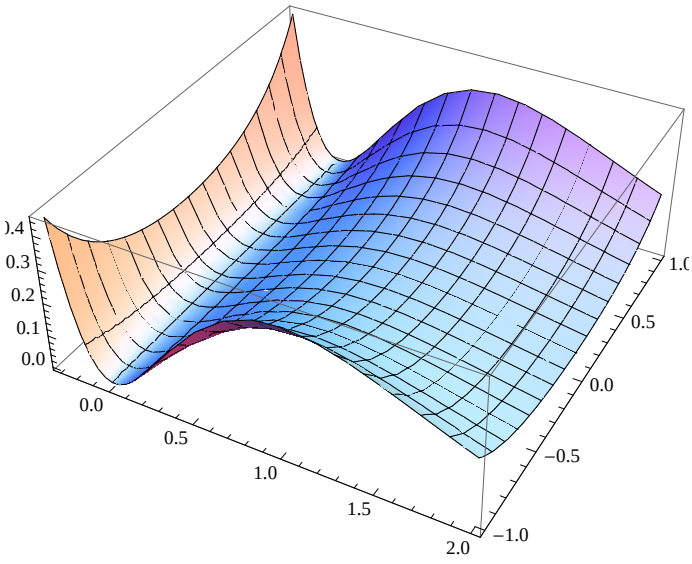
$$e^{-2x+y^2}\, x^2$$

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

$$\{\{x \to 1,\ y \to 0\},\ \{x \to 0\}\}$$

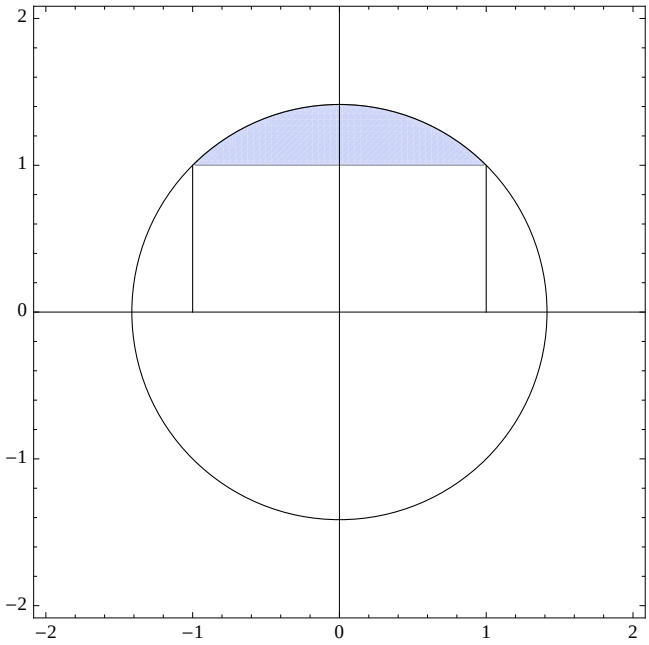
$$\begin{pmatrix} e^{-2x+y^2}\left(2 - 8x + 4x^2\right) & -4\, e^{-2x+y^2}\,(-1+x)\,x\,y \\ -4\, e^{-2x+y^2}\,(-1+x)\,x\,y & 2\, e^{-2x+y^2}\, x^2\left(1 + 2y^2\right) \end{pmatrix}$$

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



Integrale doppio – 0

```
aa = RegionPlot[{x^2 + y^2 ≤ 2 && y > 1}, {x, -2, 2}, {y, -2, 2}, PlotPoints → 100];
ab = Graphics[{
     Line[{{1, 0}, {1, 1}}],
     Line[{{-1, 0}, {-1, 1}}]}];
ac = Graphics[Circle[{0, 0}, √2 ]];
Show[aa, ab, ac, AspectRatio → Automatic, Axes → True]
```




```
f[x_, y_] := x^2/(x^2 + y^2);
g[r_, t_] := r * f[r Cos[t], r Sin[t]];
Print[Simplify[g[r, t]]]
```

```
r Cos[t]^2
```

```
f[x_, y_] := x^3/(1 + y^2);

Print[Expand[∫_(1/Sin[t])^√2 r Cos[t]^2 𝕕r]];

Print[Expand[∫_(π/4)^(3π/4) ∫_(1/Sin[t])^√2 r Cos[t]^2 𝕕r 𝕕t]]
```

```
Cos[t]^2 - Cot[t]^2/2

-3/2 + π/2
```

Numeri complessi – 0

```
Solve[e^(3 t i) == e^((3 π i)/2), t]
```

$$\left\{\left\{t \to -\frac{5\pi}{6}\right\}, \left\{t \to -\frac{\pi}{6}\right\}, \left\{t \to \frac{\pi}{2}\right\}\right\}$$

Matrici, autovalori – 0

```
a = {{-2, k, 2}, {k, 1, 4}, {2, 4, 1}}; x = {{2}, {4}, {-5}}; y = Flatten[a.x];
Print[MatrixForm[y]];
Solve[{
  y[[1]] / x[[1]] == y[[2]] / x[[2]];
  y[[3]] / x[[3]] == y[[2]] / x[[2]]
 }]
```

$$\begin{pmatrix} -14 + 4k \\ -16 + 2k \\ 15 \end{pmatrix}$$

$$\{\{k \to 2\}\}$$

```
k = 2; Print[MatrixForm[a]];
Print[Eigenvalues[a]];
Print[MatrixForm[Orthogonalize[Eigenvectors[a]]]]
```

$$\begin{pmatrix} -2 & 2 & 2 \\ 2 & 1 & 4 \\ 2 & 4 & 1 \end{pmatrix}$$

$$\{6, -3, -3\}$$

$$\begin{pmatrix} \frac{1}{3} & \frac{2}{3} & \frac{2}{3} \\ -\frac{2}{\sqrt{5}} & 0 & \frac{1}{\sqrt{5}} \\ -\frac{2}{3\sqrt{5}} & \frac{\sqrt{5}}{3} & -\frac{4}{3\sqrt{5}} \end{pmatrix}$$

```
m = Orthogonalize[Eigenvectors[a]];
Print[Simplify[MatrixForm[m.a.Transpose[m]]]]
```

$$\begin{pmatrix} 6 & 0 & 0 \\ 0 & -3 & 0 \\ 0 & 0 & -3 \end{pmatrix}$$

In[49]:=
```
Clear[k];
Solve[{a.x == h * x}, {h, k}]
```

Out[50]= $\{\{h \to -3, k \to 2\}\}$