versione 0

Equazioni differenziali – 0

```
DSolve[{y'[x] == (8 x + 3)/(2 y[x]) e^(-y[x]^2), y[-2] == Sqrt[Log[9]]},
 y[x], x]
```

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

```
Reduce[4 x^2 - 3 x ≥ 1, x]
```

$$x \le -\frac{1}{4} \ || \ x \ge 1$$

Funzioni di due variabili, punti critici – 0

```
g[x_, y_] := (x - y + 1)/(x + 3);
f[x_, y_] := g[x, y];
p1[x_] := 3 - x^2; p2[x_] := 2 - 2/3 x^2;
Print[Solve[{y == p1[x], (x - y + 1)/(x + 3) == k}, {x, y}]];
Print[Solve[9 + 10 k + k^2 == 0, k]];
Print[Solve[g[x, y] == -1, y]];
Print[Solve[g[x, y] == g[Sqrt[3], 0], y]];
```

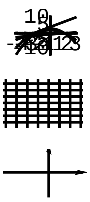
$$\left\{\left\{y \to \frac{1}{2}\left(1 - 4k - k^2 + \sqrt{9 + 10k + k^2} - k\sqrt{9 + 10k + k^2}\right),\ x \to \frac{1}{2}\left(-1 + k + \sqrt{9 + 10k + k^2}\right)\right\},\right.$$
$$\left.\left\{y \to \frac{1}{2}\left(1 - 4k - k^2 - \sqrt{9 + 10k + k^2} + k\sqrt{9 + 10k + k^2}\right),\ x \to \frac{1}{2}\left(-1 + k - \sqrt{9 + 10k + k^2}\right)\right\}\right\}$$

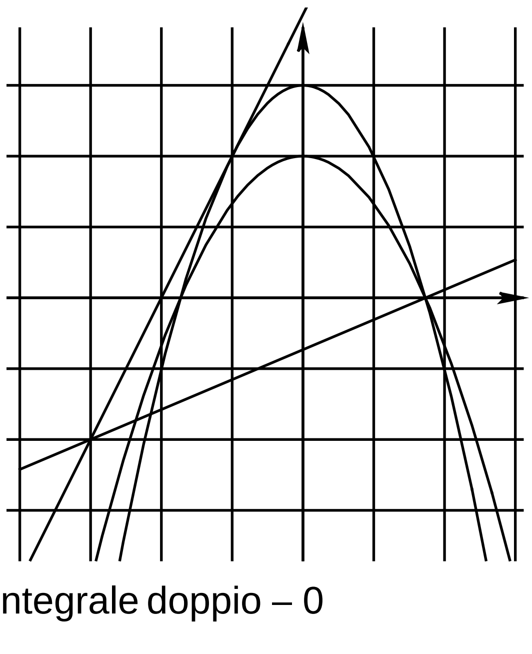
$$\{\{k \to -9\}, \{k \to -1\}\}$$

$$\{\{y \to 2\,(2 + x)\}\}$$

$$\left\{\left\{y \to -\frac{2\left(\sqrt{3} - x\right)}{3 + \sqrt{3}}\right\}\right\}$$

```
aa = Plot[{p1[x], p2[x], 2 (2 + x), -(2 (Sqrt[3] - x))/(3 + Sqrt[3])}, {x, -4, 3}]
figura[1, -4.2`, 3.1`, -3.7`, 3.8`, aa];
```





Integrale doppio – 0

```
f[x_, y_] := 1/x^2 e^(y/x);
Simplify[{r f[r Cos[t], r Sin[t]], ∫_1^3 r f[r Cos[t], r Sin[t]] dr,
  ∫_0^(π/4) ∫_1^3 r f[r Cos[t], r Sin[t]] dr dt}]
```

$$\left\{\frac{e^{\mathrm{Tan}[t]}\,\mathrm{Sec}[t]^2}{r},\ e^{\mathrm{Tan}[t]}\,\mathrm{Log}[3]\,\mathrm{Sec}[t]^2,\ (-1+e)\,\mathrm{Log}[3]\right\}$$

Numeri complessi – 0

In[20]:=
```
z = -3 + 3 √3 i;
w = √2 - √2 i;
Print[Simplify[{Re[z / w], Im[z / w]}]];
Print[Simplify[{Abs[z / w], Arg[z / w]}]]
```

$$\left\{-\frac{3}{4}\left(\sqrt{2}+\sqrt{6}\right),\ \frac{3\left(-1+\sqrt{3}\right)}{2\sqrt{2}}\right\}$$

$$\left\{3,\ \frac{11\pi}{12}\right\}$$

Matrici, autovalori – 0

In[53]:=
```
a = ( 3√3   3
       3   √3 );
Print[Simplify[Eigenvalues[a]]];
Print[Eigenvectors[a]]
```

$$\left\{4\sqrt{3},\ 0\right\}$$

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

In[59]:=
```
Print[{Normalize[Eigenvectors[a][[1]]],
  Normalize[Eigenvectors[a][[2]]]}]
```

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

In[61]:=
```
p = {{√3/2, 1/2}, {-1/2, √3/2}}; MatrixForm[p]
```

Out[61]//MatrixForm=

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

In[64]:=
```
MatrixForm[p.a.Transpose[p]]
```

Out[64]//MatrixForm=

$$\begin{pmatrix} 4\sqrt{3} & 0 \\ 0 & 0 \end{pmatrix}$$

versione 1

Equazioni differenziali – 1

```
DSolve[{y'[x] == (8 x + 3)/(2 y[x]) e^(y[x]^2), y[-1/2] == Sqrt[Log[2]]},
 y[x], x]
```

$$\left\{\left\{y[x] \to -i \sqrt{\text{Log}\left[2\left(-\frac{3x}{2}-2x^2\right)\right]}\right\}\right\}$$

```
Reduce[2 (-(3 x)/2 - 2 x^2) ≤ 1 && 2 (-(3 x)/2 - 2 x^2) ≥ 0, x]
```

$$-\frac{3}{4} \le x \le 0$$

```
Reduce[2 (13/4 - (3 x)/2 - (3 x^2)/2) ≤ 1 && 2 (13/4 - (3 x)/2 - (3 x^2)/2) ≤ 0, x]
```

Funzioni di due variabili, punti critici – 1

```
g[x_, y_] := (x - y + 1)/(x + 3);
f[x_, y_] := 2 g[x, y / 2];
Print[Together[Expand[f[x, y]]]]
p1[x_] := 2 * (3 - x^2); p2[x_] := 2 * (2 - 2/3 x^2);
Print[Solve[{y == p1[x], f[x, y] == k}, {x, y}]];
Print[Solve[9 + 10 k + k^2 == 0, k]];
Print[Solve[f[x, y] == -1, y]];
Print[Solve[f[x, y] == g[Sqrt[3], 0], y]];
```

$$\frac{2+2x-y}{3+x}$$

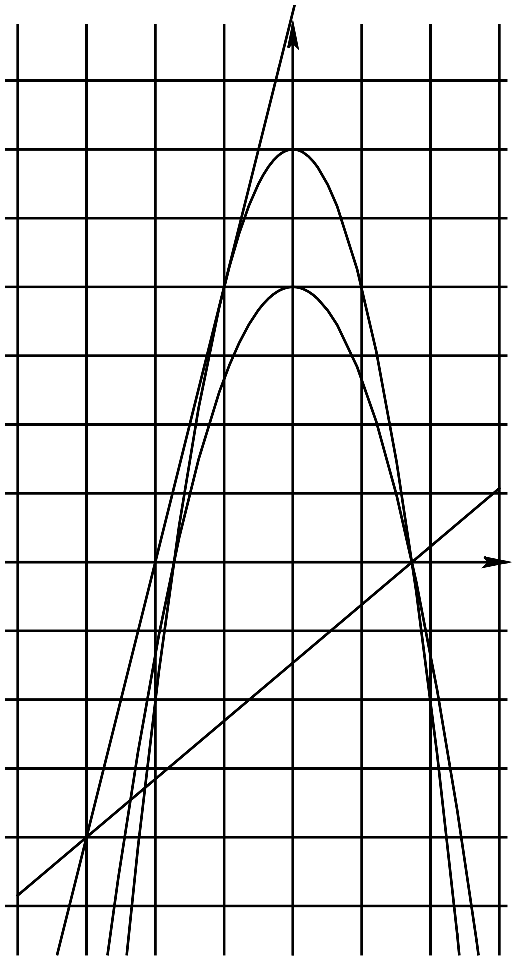
$$\left\{\left\{y\to\frac{1}{4}\left(4-8k-k^2+2\sqrt{36+20k+k^2}-k\sqrt{36+20k+k^2}\right),\ x\to\frac{1}{4}\left(-2+k+\sqrt{36+20k+k^2}\right)\right\},\right.$$
$$\left.\left\{y\to\frac{1}{4}\left(4-8k-k^2-2\sqrt{36+20k+k^2}+k\sqrt{36+20k+k^2}\right),\ x\to\frac{1}{4}\left(-2+k-\sqrt{36+20k+k^2}\right)\right\}\right\}$$

$$\{\{k\to-9\},\{k\to-1\}\}$$

$$\{\{y\to 5+3x\}\}$$

$$\left\{\left\{y\to\frac{3-\sqrt{3}+5x+\sqrt{3}\,x}{3+\sqrt{3}}\right\}\right\}$$

```
aa = Plot[{p1[x], p2[x], 4 (2 + x), -(4 (Sqrt[3] - x))/(3 + Sqrt[3])}, {x, -4, 3}]
figura[1, -4.2`, 3.1`, -5.7`, 7.8`, aa];
```



Integrale doppio – 1

```
f[x_, y_] := 1/x^2 ⅇ^(2 y/x);
Simplify[{r f[r Cos[t], r Sin[t]], ∫_1^2 r f[r Cos[t], r Sin[t]] ⅆr,
  ∫_{-π/4}^{π/4} ∫_1^2 r f[r Cos[t], r Sin[t]] ⅆr ⅆt}]
```

$$\left\{\frac{e^{2\,\mathrm{Tan}[t]}\,\mathrm{Sec}[t]^2}{r},\ e^{2\,\mathrm{Tan}[t]}\,\mathrm{Log}[2]\,\mathrm{Sec}[t]^2,\ \mathrm{Log}[2]\,\mathrm{Sinh}[2]\right\}$$

Numeri complessi – 1

```
In[36]:= z = -2 √2 + 2 √2 ⅈ;
w = 1 + √3 ⅈ;
Print[Simplify[{Re[z / w], Im[z / w]}]];
Print[Simplify[{Abs[z / w], Arg[z / w]}]]
```

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

$$\left\{2,\ \frac{5\pi}{12}\right\}$$

Matrici, autovalori – 1

In[65]:= **a = $\begin{pmatrix} 1 & \sqrt{3} \\ \sqrt{3} & 3 \end{pmatrix}$;**
Print[Simplify[Eigenvalues[a]]];
Print[Eigenvectors[a]]

{4, 0}

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

In[68]:= **Print[{Normalize[Eigenvectors[a][[1]]],**
Normalize[Eigenvectors[a][[2]]]}]

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

In[69]:= **p = $\left\{\left\{\frac{1}{2}, \frac{\sqrt{3}}{2}\right\}, \left\{-\frac{\sqrt{3}}{2}, \frac{1}{2}\right\}\right\}$; MatrixForm[p]**

Out[69]//MatrixForm=

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

In[70]:= **MatrixForm[p.a.Transpose[p]]**

Out[70]//MatrixForm=

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