versione 0

Equazioni differenziali – 0

```
TrigReduce[DSolve[{5 y''[x] - 2 y'[x] + y[x] == 8 e^(-x/5), y[0] == 6, y'[0] == 2},
  y[x], x]]
```

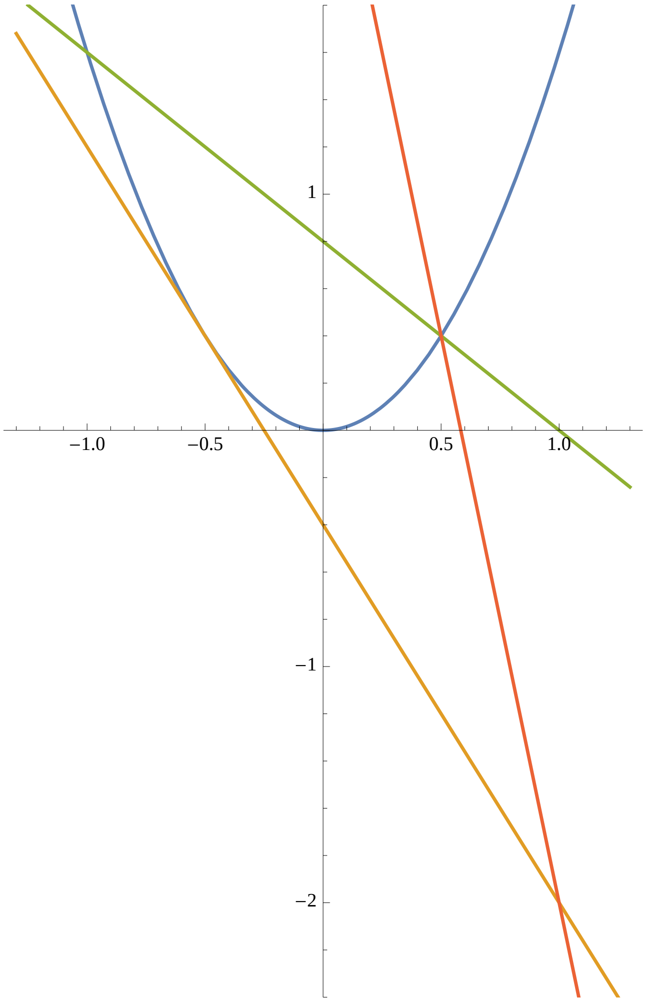
$$\left\{\left\{y[x] \to e^{-x/5}\left(5 + e^{2x/5}\,\text{Cos}\left[\frac{2x}{5}\right] + 7\,e^{2x/5}\,\text{Sin}\left[\frac{2x}{5}\right]\right)\right\}\right\}$$

Funzioni di due variabili, punti critici – 0

Minimo, massimo di $f(x, y) = \dfrac{x + y + 1}{x - 1}$

in $A = \left\{(x, y);\ \frac{8}{5}x^2 \le y \le -\frac{4}{5}(x - 1)\right\}$

assai facile con linee di livello (rette)



```
f[x_, y_] := (x + y + 1)/(x - 1);
r[x_] := -4/5 (x - 1);
p[x_] := 8/5 x^2;
Solve[{y == p[x], y == r[x]}, {x, y}]
```

$\left\{\left\{x \to -1,\ y \to \frac{8}{5}\right\},\ \left\{x \to \frac{1}{2},\ y \to \frac{2}{5}\right\}\right\}$

```
f[1/2, 2/5]
```

$-\frac{19}{5}$

```
q[x_] := (x - 1) * (f[x, p[x]] - k); Simplify[q[x]]
```

$1 + k + x - k\,x + \frac{8\,x^2}{5}$

```
Solve[q[x] == 0, x]
```

$\left\{\left\{x \to \frac{1}{16}\left(-5 + 5\,k - \sqrt{5}\,\sqrt{-27 - 42\,k + 5\,k^2}\right)\right\},\ \left\{x \to \frac{1}{16}\left(-5 + 5\,k + \sqrt{5}\,\sqrt{-27 - 42\,k + 5\,k^2}\right)\right\}\right\}$

```
Solve[-27 - 42 k + 5 k^2 == 0, k]
```

$\left\{\left\{k \to -\frac{3}{5}\right\},\ \{k \to 9\}\right\}$

(La soluzione da accettare è $-\frac{3}{5}$)

Integrale doppio – 0

$A = \left\{(x, y);\ x^2 + y^2 \leq 2,\ x \geq 1,\ \ y \geq 0\right\}$

```
f[x_, y_] := (2 y)/(6 x - x^3)^2;
Simplify[{∫_0^Sqrt[2-x^2] f[x, y] dy,
  ∫_1^Sqrt[2] ∫_0^Sqrt[2-x^2] f[x, y] dy dx}]
```

$\left\{\frac{2 - x^2}{x^2\left(-6 + x^2\right)^2},\ \frac{1}{120}\left(8 - 5\sqrt{2}\right)\right\}$

Numeri complessi – 0

In[1]:=
```
Solve[
 (1 - i) z^2 - (7 - i) z + 8 + 6 i == 0, z]
```

Out[1]= $\{\{z \to 1 + 2\,i\},\ \{z \to 3 + i\}\}$

matrici, autovalori – 0

In[6]:= $a = \begin{pmatrix} 4 & 4 & 3 & 7 \\ 4 & 6 & -1 & 2 \\ 3 & -1 & -1 & -5 \\ 7 & 2 & -5 & 0 \end{pmatrix}$; i = IdentityMatrix[4]; MatrixForm[a - 3 i]

Out[6]//MatrixForm=

$$\begin{pmatrix} 1 & 4 & 3 & 7 \\ 4 & 3 & -1 & 2 \\ 3 & -1 & -4 & -5 \\ 7 & 2 & -5 & -3 \end{pmatrix}$$

In[8]:= MatrixRank[a - 3 i]

Out[8]= 2

In[11]:= CharacteristicPolynomial[a, λ]

Out[11]= $-1053 + 675\,\lambda - 90\,\lambda^2 - 9\,\lambda^3 + \lambda^4$

In[12]:= Factor[%]

Out[12]= $(-3 + \lambda)^2\,(-117 - 3\,\lambda + \lambda^2)$

In[16]:= Solve$\left[(a - 3\,i).\begin{pmatrix} x \\ y \\ z \\ w \end{pmatrix} == \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \{x, y, z, w\}\right]$

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

Out[16]= $\{\{x \to w + z,\ y \to -2\,w - z\}\}$

In[17]:= Eigenvectors[a]

Out[17]= $\left\{\left\{\frac{1}{7} + \frac{1}{21}\left(3 + 3\sqrt{53}\right),\ \frac{4}{7} + \frac{1}{42}\left(3 + 3\sqrt{53}\right),\ \frac{3}{7} + \frac{1}{42}\left(-3 - 3\sqrt{53}\right),\ 1\right\},\right.$
$\left\{\frac{1}{7} + \frac{1}{21}\left(3 - 3\sqrt{53}\right),\ \frac{4}{7} + \frac{1}{42}\left(3 - 3\sqrt{53}\right),\ \frac{3}{7} + \frac{1}{42}\left(-3 + 3\sqrt{53}\right),\ 1\right\},$
$\left.\{1, -2, 0, 1\},\ \{1, -1, 1, 0\}\right\}$