versione 0

Equazioni differenziali – 0

In[190]:=
```
Simplify[DSolve[{
    y'[x] == (8 x + 4 x y[x]^2)/y[x],
    y[1] == Sqrt[e - 2]
   }, y[x], x]]
```

Out[190]= $\left\{\left\{y[x] \to \frac{\sqrt{-2\,e^3 + e^{4x^2}}}{e^{3/2}}\right\}\right\}$

In[191]:=
```
Reduce[-2 e^3 + e^(4 x^2) > 0, x, Reals]
```

Out[191]= $x < -\frac{1}{2}\sqrt{3 + \text{Log}[2]} \;||\; x > \frac{1}{2}\sqrt{3 + \text{Log}[2]}$

Funzioni di due variabili, punti critici – 0

In[195]:=
```
g[x_, y_] := -3 Log[x^2 + y] + 1/2 y + x;
f[x_, y_] := g[x, y]; Print[f[x, y]];
grad = Simplify[{Together[D[f[x, y], x]], Together[D[f[x, y], y]]}]
```

$x + \frac{y}{2} - 3\,\text{Log}[x^2 + y]$

Out[197]= $\left\{\frac{-6x + x^2 + y}{x^2 + y}, \frac{-6 + x^2 + y}{2\left(x^2 + y\right)}\right\}$

In[97]:=
```
Reduce[grad == {0, 0}, {x, y}]
```

Out[97]= $x == 1 \;\&\&\; y == 5$

In[98]:=
```
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]]];
```

$$\begin{pmatrix} \frac{12x^2}{(x^2+y)^2} - \frac{6}{x^2+y} & \frac{6x}{(x^2+y)^2} \\ \frac{6x}{(x^2+y)^2} & \frac{3}{(x^2+y)^2} \end{pmatrix}$$

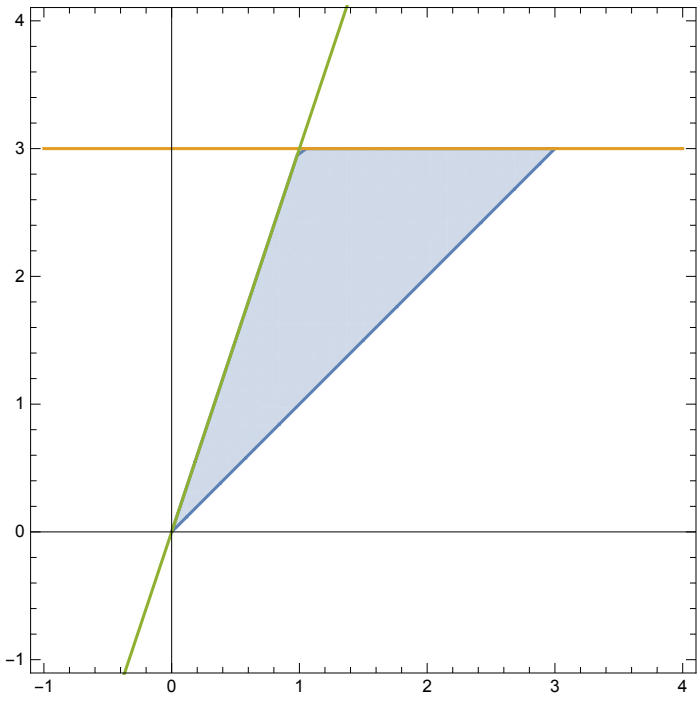
In[100]:=
```
Print[{MatrixForm[H[1, 5]]}];
```

$$\left\{\begin{pmatrix} -\frac{2}{3} & \frac{1}{6} \\ \frac{1}{6} & \frac{1}{12} \end{pmatrix}\right\}$$

Integrale doppio – 0

In[180]:=
```
f[x_, y_] := y^4 * e^(x y^2);
aa = RegionPlot[{x ≤ y ≤ 3 x && y ≤ 3}, {x, -1, 4}, {y, -1, 4}];
ab = Plot[{y, 3, 3 x}, {x, -1, 4}];
Show[aa, ab, AspectRatio → Automatic, Axes → True]
```

Out[183]=



In[185]:=
```
Simplify[{
  ∫_(1/3 y)^y f[x, y] dx,
  ∫∫_(1/3 y)^y f[x, y] dx dy,
  ∫_0^3 ∫_(1/3 y)^y f[x, y] dx dy
 }]
```

Out[185]= $\left\{\left(-e^{\frac{y^3}{3}}+e^{y^3}\right) y^2,\ -e^{\frac{y^3}{3}}+\frac{e^{y^3}}{3},\ \frac{1}{3}\left(2-3e^9+e^{27}\right)\right\}$

Numeri complessi – 0

In[222]:=
```
Refine[(1 + i)^-2 * e^((5-i) x), {x ∈ Reals}]
```

Out[222]= $-\frac{1}{2} i\, e^{(5-i)x}$

In[224]:=
```
Refine[Abs[(1 + i)^-2 * e^((5-i) x)], {x ∈ Reals}]
```

Out[224]= $\frac{e^{5x}}{2}$

In[230]:=
```
Refine[Re[(1 + i)^-2 * e^((5-i) x)], {x ∈ Reals}]
```

Out[230]= $\frac{1}{2}\,\text{Im}\left[e^{(5-i)x}\right]$

In[228]:=
```
Refine[Im[(1 + i)^-2 * e^((5-i) x)], {x ∈ Reals}]
```

Out[228]=
$$-\frac{1}{2}\,\text{Re}\left[e^{(5-i)\,x}\right]$$

Matrici, autovalori – 0

In[235]:=
```
a = {{3, 0, 0}, {1, 3, 2}, {2, 0, -3}}; MatrixForm[a]
```

Out[235]//MatrixForm=
$$\begin{pmatrix} 3 & 0 & 0 \\ 1 & 3 & 2 \\ 2 & 0 & -3 \end{pmatrix}$$

In[236]:=
```
Eigenvalues[a]
```

Out[236]=
```
{-3, 3, 3}
```

In[237]:=
```
Eigenvectors[a]
```

Out[237]=
```
{{0, -1, 3}, {0, 1, 0}, {0, 0, 0}}
```

versione I

Equazioni differenziali – I

In[186]:=
```
Simplify[DSolve[{
    y'[x] == (3 x + x y[x]^4)/(2 y[x]^3),
    y[1] == (e^2 - 3)^(1/4)
   }, y[x], x]]
```

Out[186]=
$$\left\{\left\{y[x] \to \left(-3 + e^{1+x^2}\right)^{1/4}\right\}\right\}$$

In[188]:=
```
Reduce[-3 + e^(1+x^2) > 0, x, Reals]
```

Out[188]=
$$x < -\sqrt{-1 + \text{Log}[3]} \;||\; x > \sqrt{-1 + \text{Log}[3]}$$

Funzioni di due variabili, punti critici – I

In[198]:=
```
g[x_, y_] := -3 Log[x^2 + y] + 1/2 y + x;
f[x_, y_] := g[y, -x]; Print[f[x, y]];
grad = Simplify[{Together[D[f[x, y], x]], Together[D[f[x, y], y]]}]
```

$$-\frac{x}{2} + y - 3\,\text{Log}[-x + y^2]$$

Out[200]=
$$\left\{-\frac{6 + x - y^2}{2\,x - 2\,y^2},\ \frac{x - (-6 + y)\,y}{x - y^2}\right\}$$

In[201]:=
```
Reduce[grad == {0, 0}, {x, y}]
```

Out[201]=
```
x == -5 && y == 1
```

In[202]:=
```
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]]];
```

$$\begin{pmatrix} \frac{3}{(-x+y^2)^2} & -\frac{6y}{(-x+y^2)^2} \\ -\frac{6y}{(-x+y^2)^2} & \frac{12y^2}{(-x+y^2)^2} - \frac{6}{-x+y^2} \end{pmatrix}$$

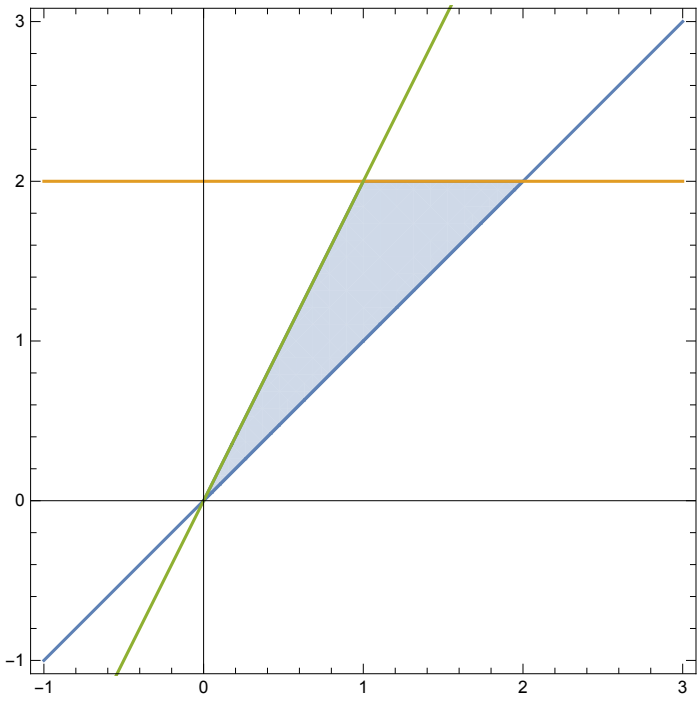
In[204]:=
```
Print[{MatrixForm[H[-5, 1]]}];
```

$$\left\{\begin{pmatrix} \frac{1}{12} & -\frac{1}{6} \\ -\frac{1}{6} & -\frac{2}{3} \end{pmatrix}\right\}$$

Integrale doppio – 1

In[205]:=
```
f[x_, y_] := y^2 * e^(x y);
aa = RegionPlot[{x ≤ y ≤ 2 x && y ≤ 2}, {x, -1, 3}, {y, -1, 3}];
ab = Plot[{x, 2, 2 x}, {x, -1, 3}];
Show[aa, ab, AspectRatio → Automatic, Axes → True]
```

Out[208]=



In[209]:=
```
Simplify[{
  ∫_(1/2 y)^y f[x, y] dx,
  ∫∫_(1/2 y)^y f[x, y] dx dy,
  ∫_0^2 ∫_(1/2 y)^y f[x, y] dx dy
 }]
```

Out[209]=
$$\left\{\left(-e^{\frac{y^2}{2}} + e^{y^2}\right) y,\ -e^{\frac{y^2}{2}} + \frac{e^{y^2}}{2},\ \frac{1}{2}\left(-1 + e^2\right)^2\right\}$$

Numeri complessi – 1

In[240]:=
```
Refine[(1 - i)^-2 * e^((3+i)*x), {x ∈ Reals}]
```

Out[240]=
$$\frac{1}{2}\, i\, e^{(3+i)\,x}$$

In[241]:=
```
Refine[Abs[(1 - i)^-2 * e^((3+i)*x)], {x ∈ Reals}]
```

Out[241]=
$$\frac{e^{3\,x}}{2}$$

In[242]:=
```
Refine[Re[(1 - i)^-2 * e^((3+i)*x)], {x ∈ Reals}]
```

Out[242]=
$$-\frac{1}{2}\, \text{Im}\left[e^{(3+i)\,x}\right]$$

In[243]:=
```
Refine[Im[(1 - i)^-2 * e^((3+i)*x)], {x ∈ Reals}]
```

Out[243]=
$$\frac{1}{2}\, \text{Re}\left[e^{(3+i)\,x}\right]$$

Matrici, autovalori – I

In[244]:=
```
a = {{2, 0, 0}, {1, 2, 5}, {5, 0, -2}}; MatrixForm[a]
```

Out[244]//MatrixForm=
$$\begin{pmatrix} 2 & 0 & 0 \\ 1 & 2 & 5 \\ 5 & 0 & -2 \end{pmatrix}$$

In[245]:=
```
Eigenvalues[a]
```

Out[245]=
```
{-2, 2, 2}
```

In[246]:=
```
Eigenvectors[a]
```

Out[246]=
```
{{0, -5, 4}, {0, 1, 0}, {0, 0, 0}}
```