sympy_Urbaniak

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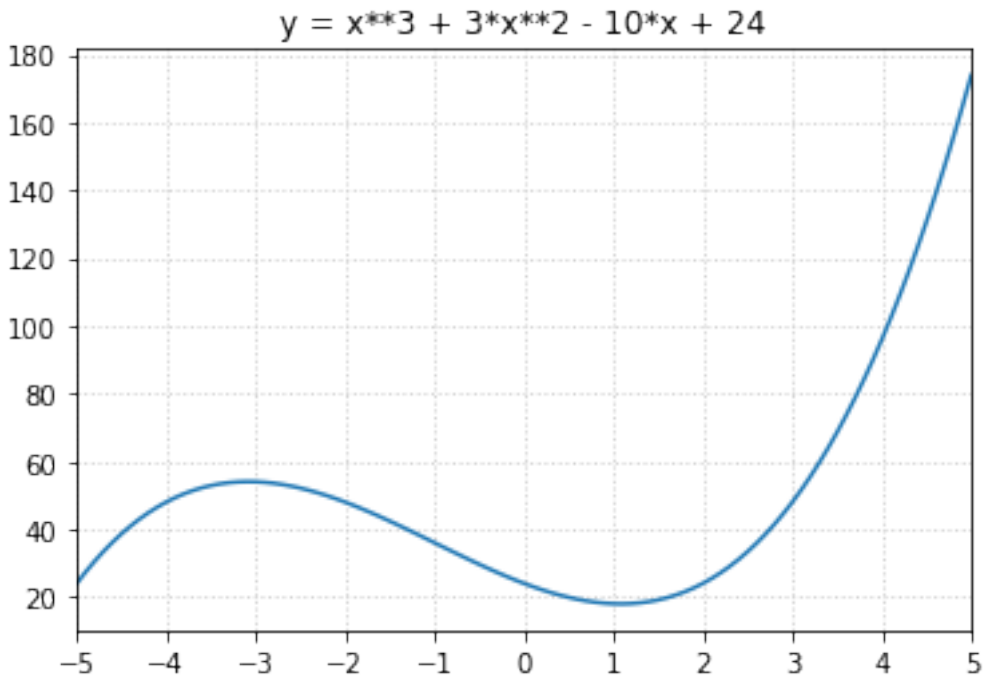
In [28]:
```
%matplotlib inline
from sympy.interactive import printing
printing.init_printing(use_latex=True)
import sympy as sym
import numpy as np
import matplotlib.pyplot as plt
# Definicje zmiennych
x, y = sym.symbols("x y")

W = (x**3 + 3*x**2 - 10*x + 24)
```

In [48]:
```
x_val = np.arange(-5,5.1,0.1)
#Wx = [W.evalf(x_val[i]) for i in range(len(x_val))]
Wx = [W.subs(x,i) for i in x_val]
W_plot = plt.subplot(111)
W_plot.plot(x_val,Wx)
W_plot.grid(color='#D3D3D3', linestyle='dotted', linewidth=1)
W_plot.set_xlim(-5,5)
W_plot.set_title('y = ' + str(W))
W_plot.set_xticks([x for x in range(-5, 6)])
print('Pierwiastki wielomianu: ')
sym.solve(sym.Eq(W),x)
```

```
Pierwiastki wielomianu:
```

Out[48]:

$$\left[-1 - \frac{13}{\left(-\frac{1}{2} - \frac{\sqrt{3}i}{2}\right)\sqrt[3]{3\sqrt{19653}+486}} - \frac{1}{3}\left(-\frac{1}{2} - \frac{\sqrt{3}i}{2}\right)\sqrt[3]{3\sqrt{19653}+486},\quad -1 - \frac{1}{3}\left(-\frac{1}{2} + \frac{\sqrt{3}i}{2}\right)\sqrt[3]{3\sqrt{19653}+486}\right.$$




```
In [68]: Equations = [sym.Eq(x**2 + 3*y,10), sym.Eq(4*x - y**2,-2)]
         solutionsEq = sym.solve(Equations,[x,y])
         print('Ilosc rozwiazan: ' + str(len(solutionsEq)))
         print('Rozwiazania ukladu rownan: ')
         solutionsEq
```

```
Ilosc rozwiazan: 4
Rozwiazania ukladu rownan:
```

Out[68]:

$$\left[\left(-\frac{1}{2}+\frac{1}{4}\left(-\frac{1}{2}\sqrt{-\frac{928}{9\sqrt[3]{\frac{1072}{27}+\frac{16\sqrt{4873}}{3}}}+\frac{8}{3}+2\sqrt[3]{\frac{1072}{27}+\frac{16\sqrt{4873}}{3}}}+\frac{1}{2}\sqrt{-2\sqrt[3]{\frac{1072}{27}+\frac{16\sqrt{4873}}{3}}+\frac{16}{3}+\frac{9}{9\sqrt[3]{\frac{1072}{27}}}}\right.\right.\right.$$

```
In [82]: print('Rozwizania ukadu równa w postaci numerycznej: ')
         for solution in solutionsEq:
             print('x = ' + str(solution[0].evalf()) + ', y = ' + str(solution[1].evalf()))
```

```
Rozwizania ukadu równa w postaci numerycznej:
x = 1.35338582359163, y = 2.72278227083374
```

```
x = -3.12273673247333 - 1.62282840726831*I, y = 0.960695779699584 - 3.37844391858529*I
x = -3.12273673247333 + 1.62282840726831*I, y = 0.960695779699584 + 3.37844391858529*I
x = 4.89208764135504, y = -4.64417383023290
```

In [87]:
```
deriv = sym.sin(sym.log(x,2)) * sym.cos(x**2)/x
print('Pochodna: ')
deriv.diff()
```

```
Pochodna:
```

Out[87]:

$$-2\sin\left(x^2\right)\sin\left(\frac{\log\left(x\right)}{\log\left(2\right)}\right)-\frac{1}{x^2}\sin\left(\frac{\log\left(x\right)}{\log\left(2\right)}\right)\cos\left(x^2\right)+\frac{\cos\left(x^2\right)}{x^2\log\left(2\right)}\cos\left(\frac{\log\left(x\right)}{\log\left(2\right)}\right)$$