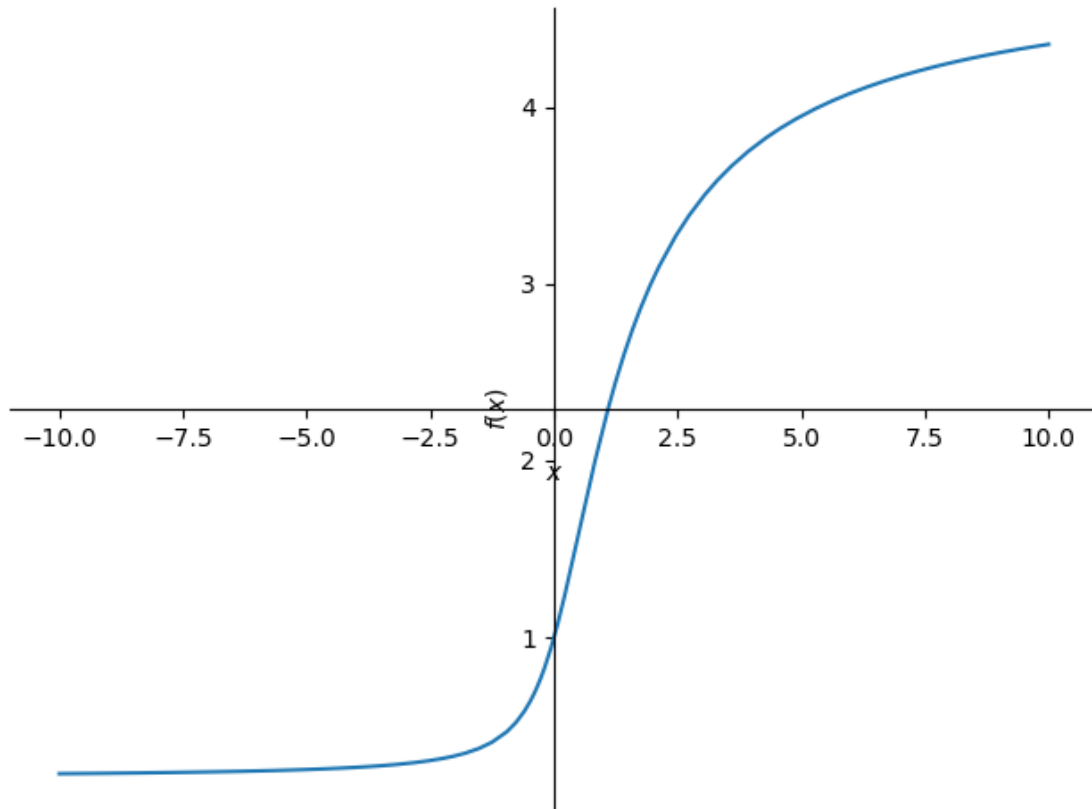# 01-list

March 23, 2023

Hello, I'm an example Jupyter Notebook!

```python
from sympy import *
init_printing()
```

```python
x = symbols('x')
e = exp(1)
```

```python
# Funkcja
f = e ** atan(x)

plot(f)

A = limit(f / x, x, oo)
B = limit(f - A * x, x, oo)
Bp = limit(f - A * x, x, -oo)

y = A * x + B

print(f'A = {A}, B = {B}, B\' = {Bp}')
print(f.subs(x, 0), f.subs(x, 1), round(f.subs(x, 2), 2), round(f.subs(x, -1),
  ↪5))
```

```
A = 0, B = exp(pi/2), B' = exp(pi/2)
1 exp(pi/4) 3.03 0.45594
```

```
[ ]: # 3

     xs = [1.11, 2.22, 3.33, 4.44]

     k = 1
     while k < 5:
         prim = "'" * k
         p = round(diff(f, x, k).subs(x, xs[k - 1]), 3)
         print(f'f{prim}(x) = {p}')
         k += 1
```
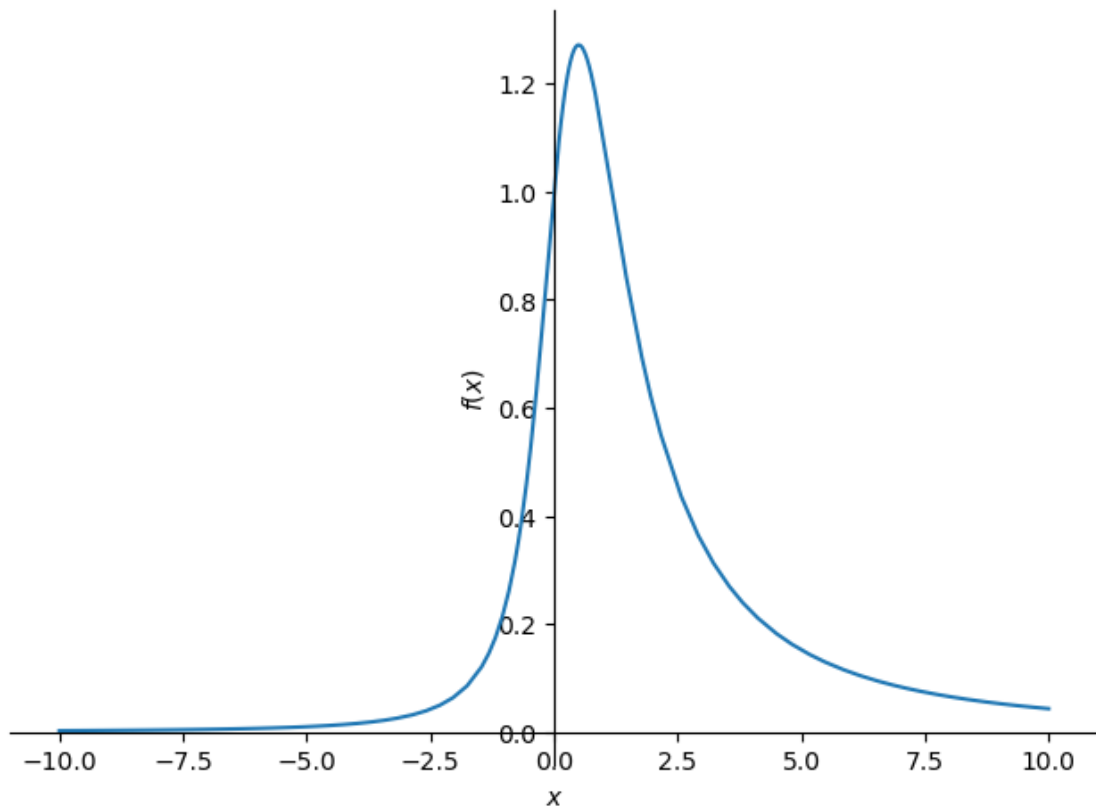
```
f'(x) = 1.035
f''(x) = -0.308
f'''(x) = 0.093
f''''(x) = -0.028
```
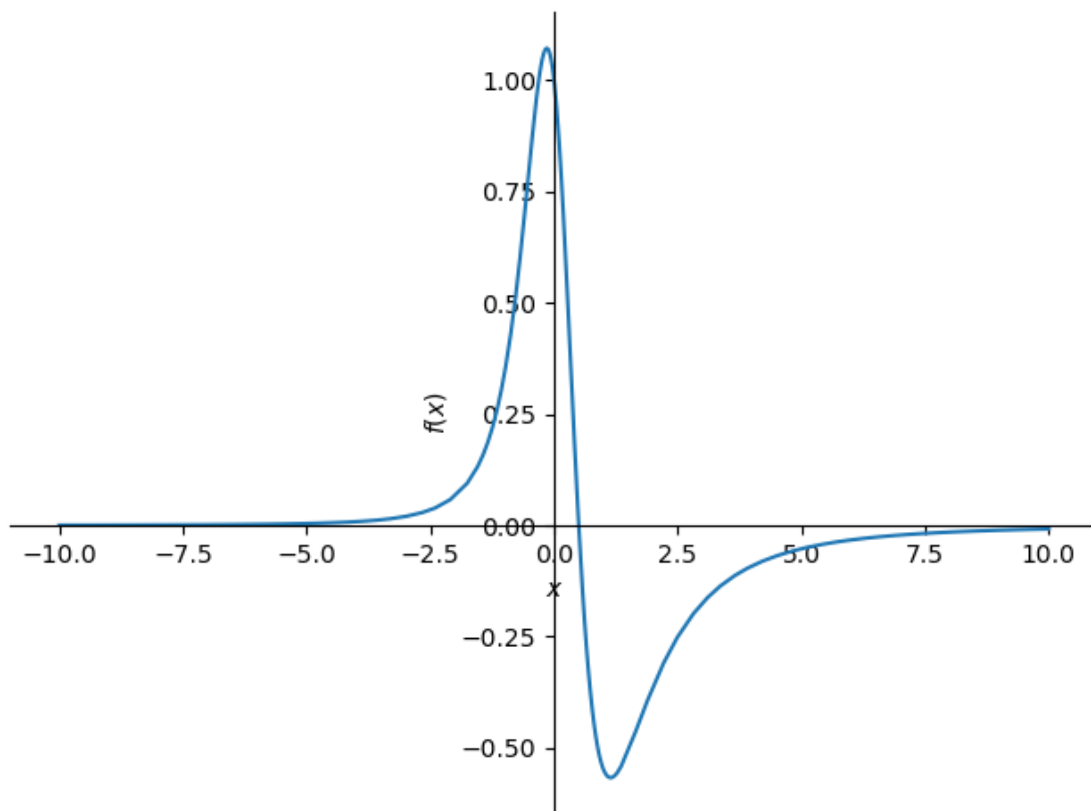
```
[ ]: # 4
     fp = diff(f, x)
```

```
plot(fp)
solve(fp > 0), solve(fp < 0)
```


[ ]: $(-\infty < x \wedge x < \infty, \ \text{False})$

```
[ ]: fpp = diff(f, x, 2)
     plot(fpp)
     solve(fpp > 0), solve(fpp < 0)
```

[ ]: $\left(-\infty < x \land x < \dfrac{1}{2}, \ \dfrac{1}{2} < x \land x < \infty\right)$

[ ]:
```
# 6

solve(fp)
```

[ ]: $[\,]$

[ ]:
```
# 7
solve(fpp)
```

[ ]: $\left[\dfrac{1}{2}\right]$

[ ]:
```
# 8
round(integrate(f, (x, 1, 7)), 3)
```

[ ]: 21.573

[ ]:
```
# 9
L = integrate(sqrt(1 + fp ** 2), (x, 1, 7))
L
```

[ ]:
$$\int_1^7 \frac{\sqrt{x^4 + 2x^2 + e^{2\arctan(x)} + 1}}{x^2 + 1}\,dx$$

[ ]: `round(L, 3)`

[ ]: 6.478