

$$f(x) = \text{Arctg}\left(\frac{x+1}{x}\right)$$

### 1. Domaine de définition

$$\text{Dom } f = \mathbb{R} \setminus \{0\}$$

$\text{Arctg}\left(\frac{x+1}{x}\right)$  n'est ni paire ni impaire

### 2. Signe de f

|  |   |    |   |   |   |
|--|---|----|---|---|---|
| $x$                                      |   | -1 |   | 0 |   |
| $\text{Arctg}\left(\frac{x+1}{x}\right)$ | + | 0  | - |   | + |

### 3. Limites et asymptotes

$$\begin{cases} \lim_{x \rightarrow 0^-} \text{Arctg}\left(\frac{x+1}{x}\right) = -\frac{\pi}{2} \\ \lim_{x \rightarrow 0^+} \text{Arctg}\left(\frac{x+1}{x}\right) = \frac{\pi}{2} \end{cases}$$

$$\lim_{x \rightarrow +\infty} \text{Arctg}\left(\frac{x+1}{x}\right) = \frac{\pi}{4}$$

$$\lim_{x \rightarrow -\infty} \text{Arctg}\left(\frac{x+1}{x}\right) = \frac{\pi}{4}$$

$$\text{AH} \equiv y = \frac{\pi}{4}$$

### 4. Intersection avec les axes

$$\text{Gf} \cap X = \{(-1, 0)\}$$

$$\text{Gf} \cap Y = \{\}$$

### 5. Etude de f

$$f'(x) = -\frac{1}{2x^2 + 2x + 1}$$

|                        |   |   |   |
|------------------------|---|---|---|
| $x$                    |   | 0 |   |
| $-\frac{1}{2x^2+2x+1}$ | - |   | - |

### 6. Etude de f''

$$f''(x) = \frac{2(2x+1)}{(2x^2+2x+1)^2}$$

|                                 |   |                |   |   |   |
|---------------------------------|---|----------------|---|---|---|
| $x$                             |   | $-\frac{1}{2}$ |   | 0 |   |
| $\frac{2(2x+1)}{(2x^2+2x+1)^2}$ | - | 0              | + |   | + |

$$I: \left(-\frac{1}{2}, -\frac{\pi}{4}\right)$$

### 7. Tableau récapitulatif

|           |                     |   |    |   |                  |   |    |   |                     |
|-----------|---------------------|---|----|---|------------------|---|----|---|---------------------|
| $x$       | $-\infty$           |   | -1 |   | $-\frac{1}{2}$   |   | 0  |   | $+\infty$           |
| $f(x)$    | $\frac{\pi}{4}$     | + | 0  | - | $-\frac{\pi}{4}$ | - |    | + | $\frac{\pi}{4}$     |
|           | $y = \frac{\pi}{4}$ |   |    |   | $I$              |   |    |   | $y = \frac{\pi}{4}$ |
| penete    | 0                   | - | -1 | - | -2               | - | -1 | - | 0                   |
| concavité | 0                   | - | -2 | - | 0                | + | 2  | + | 0                   |

### 8. Graphe de f

2 |  $\text{arctg}(x+1):x.nb$

