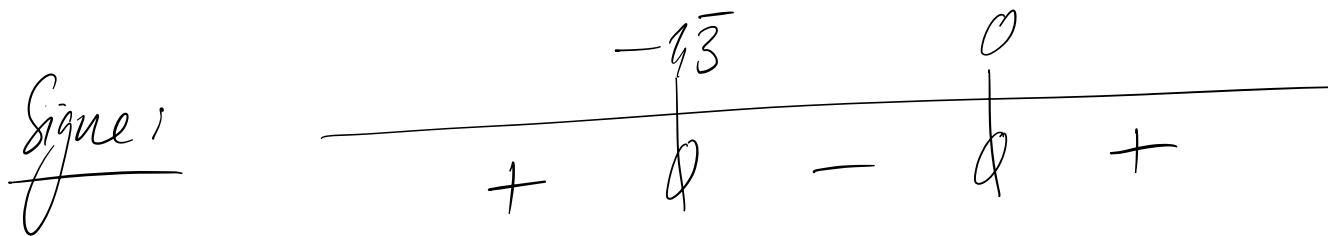


$$D_f = \mathbb{R} \quad (f \text{ est un polynôme})$$

Zéros: $3x^4 + 4x^3 = 0 \Leftrightarrow x^3(3x+4) = 0$

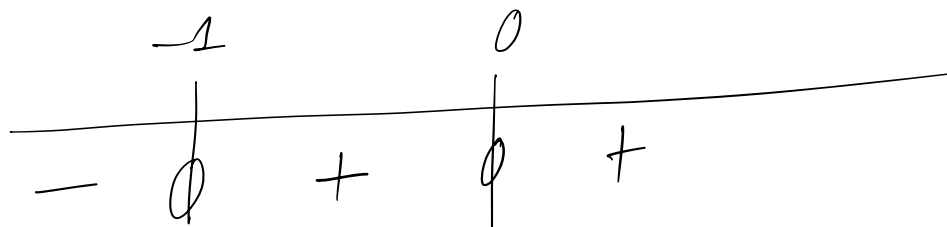
$$\Leftrightarrow x = -\frac{4}{3} = -1\bar{3} \quad \text{ou} \quad x = 0$$



Asymptotes: —

Dérivée et croissance: $f'(x) = 12x^3 + 12x^2$
 $= 12x^2(x+1)$

$$f'(x) = 0 \Leftrightarrow x = 0 / x = -1$$

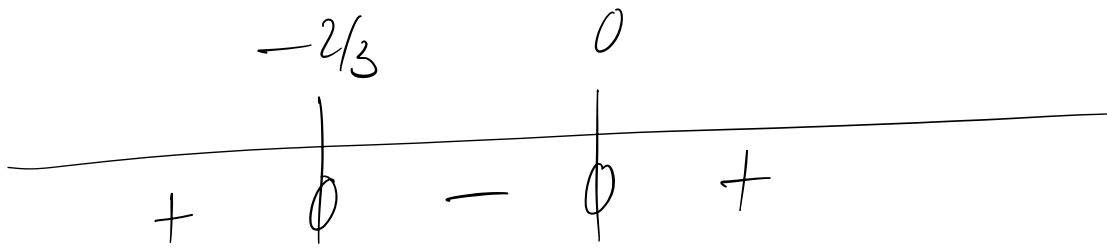


min pôle

$$(-1; -1) \quad (0; 0)$$

Dérivée seconde et courbure : $f''(x) = 36x^2 + 24x$
 $= 12x(3x + 2)$

$$f''(x) = 0 \Leftrightarrow x = 0 \text{ / } x = -\frac{2}{3}$$



V P.I. \cap P.I. V

$$\left(-\frac{2}{3}; -\frac{16}{27}\right) \quad (0; 0)$$

$$f\left(-\frac{2}{3}\right) = 3 \cdot \left(-\frac{2}{3}\right)^4 + 4 \cdot \left(\frac{2}{3}\right)^3 = -\frac{16}{27} \approx -0,59$$

$$f'\left(-\frac{2}{3}\right) = 12 \cdot \left(-\frac{2}{3}\right)^3 + 12 \cdot \left(-\frac{2}{3}\right)^2 = \frac{16}{9} \approx 1,78$$

↑
pente de la
tangente
(à reporter
sur le graphe)

$$f(1) = 7$$

$$f(-2) = -48$$

