1) $f(x) = \sqrt{x+2}$ $\qquad D = [-2, +\infty)$

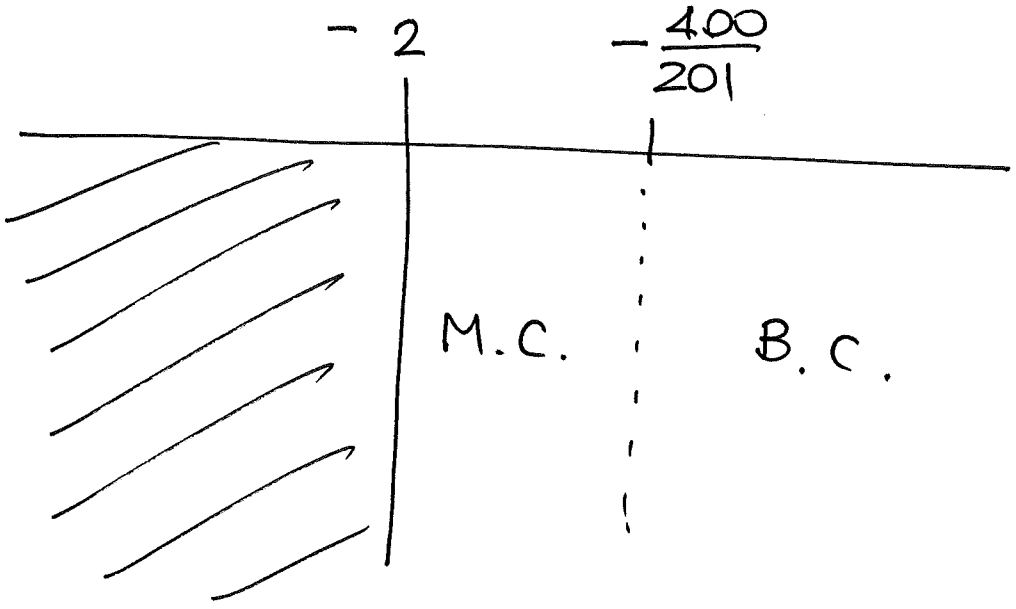
$$K_f(x) = \left| \frac{x f'(x)}{f(x)} \right| = \left| \frac{x \, \frac{1}{2\sqrt{x+2}}}{\sqrt{x+2}} \right| = \left| \frac{x}{2(x+2)} \right|$$

$$D' = (-2, +\infty)$$

Ben condizionato, es:

$$\left| \frac{x}{2(x+2)} \right| < 100 \quad \dots\dots > \begin{cases} \frac{x}{2(x+2)} < 100 \\ \frac{x}{2(x+2)} > -100 \end{cases}$$

$$\Rightarrow \quad x > -\frac{400}{201} \approx -1.99005$$

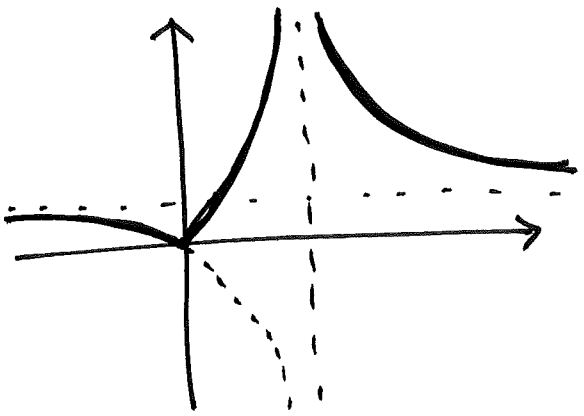


x1 = -1.991; x2 = -1.992;
f1 = sqrt(x1+2); f2 = sqrt(x2+2);
A = (f2-f1)/f1;
B = (x1-x2)/x1;
A/B % ~ condizionamento

2) Cancellazione numerica ~ mal condiz.

$f(x) = x - 4$

$K_f(x) = \left| \frac{x}{x-4} \right| \quad x \neq 4$



$x_0 = 4.001$ (esatto)
$x = 4.002$ (perturbato)

$\Delta x = 10^{-3}$

$f(x_0) = 0.001$ (ex)
$f(x) = 0.002$ (pert.)

$\Delta f = 10^{-3}$

$\frac{\Delta f}{f} = \frac{0.001}{0.001} = 1$ $\qquad$ $\frac{\Delta x}{x} = \frac{0.001}{4.001} \approx 0.00025$

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

```
>> x = 4e7;
y1 = sqrt(x^2+1) - x; y2 = 1/(sqrt(x^2+1) + x);
err = abs((y1-y2)/y2);
```

(caso $x \to +\infty$)

4) $f(x) = \dfrac{(1+x)-1}{x} \qquad \left(= 1 \quad \forall x \neq 0\right)$

Esempio di cancellazione

$x = 1e-8,\ 1e-10,\ 1e-12,\ 1e-14$

$f = ((1+x)-1)/x$

5) $\lim_{n \to \infty} \left(1 + \frac{1}{n}\right)^n = e$

$n = 10\hat{}2 \ldots\ldots 10\hat{}6 \ldots\ldots 10\hat{}10$

$xn = (1 + 1/n)\hat{}n$

$err = abs\left(xn - exp(1)\right)/exp(1);$