$f(x) = 3x^4 - 4x^3$

- domain $D_f = \mathbb{R}$ $\quad (x \in \mathbb{R})$
- $f'(x) = 12x^3 - 12x^2$ $\qquad D_{f'} = \mathbb{R}$
- $12x^3 - 12x^2 = 12x^2(x-1)$

$x_1 = 0 \qquad x_2 = 1$

	$(-\infty, 0)$	0	$(0, 1)$	1	$(1, \infty)$
f'	$-$	0	$-$	0	$+$
f	decr. ↘		↘		incr. ↗

suspects

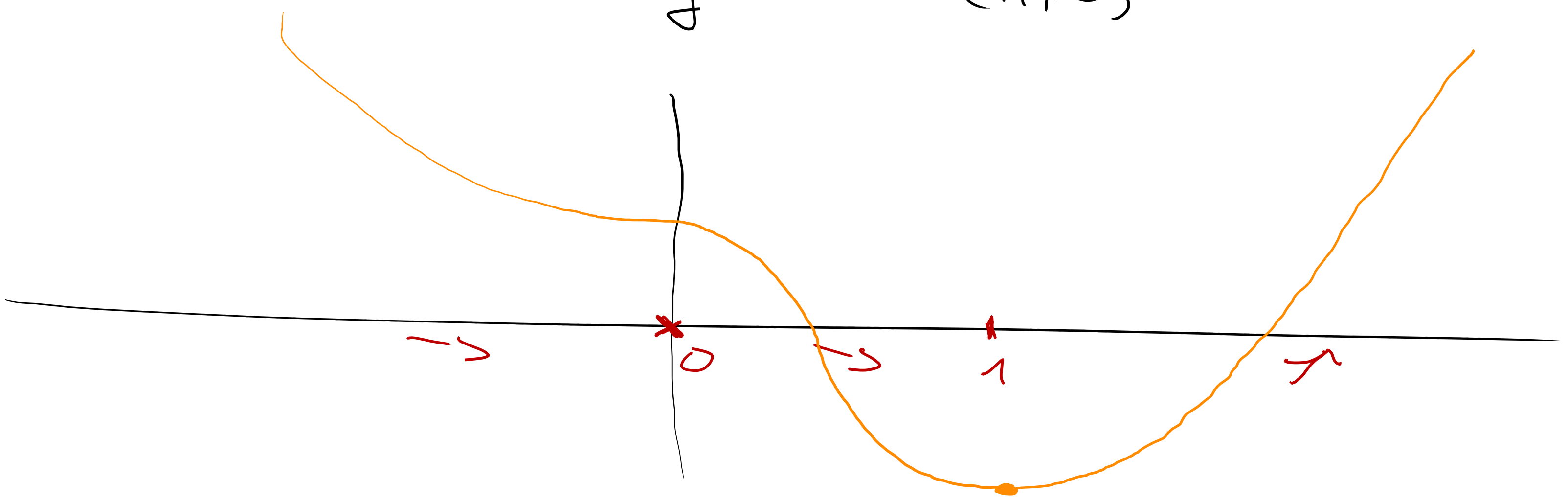
$x_1 = 0 \qquad x_2 = 1$

↘ ↘ no extrema

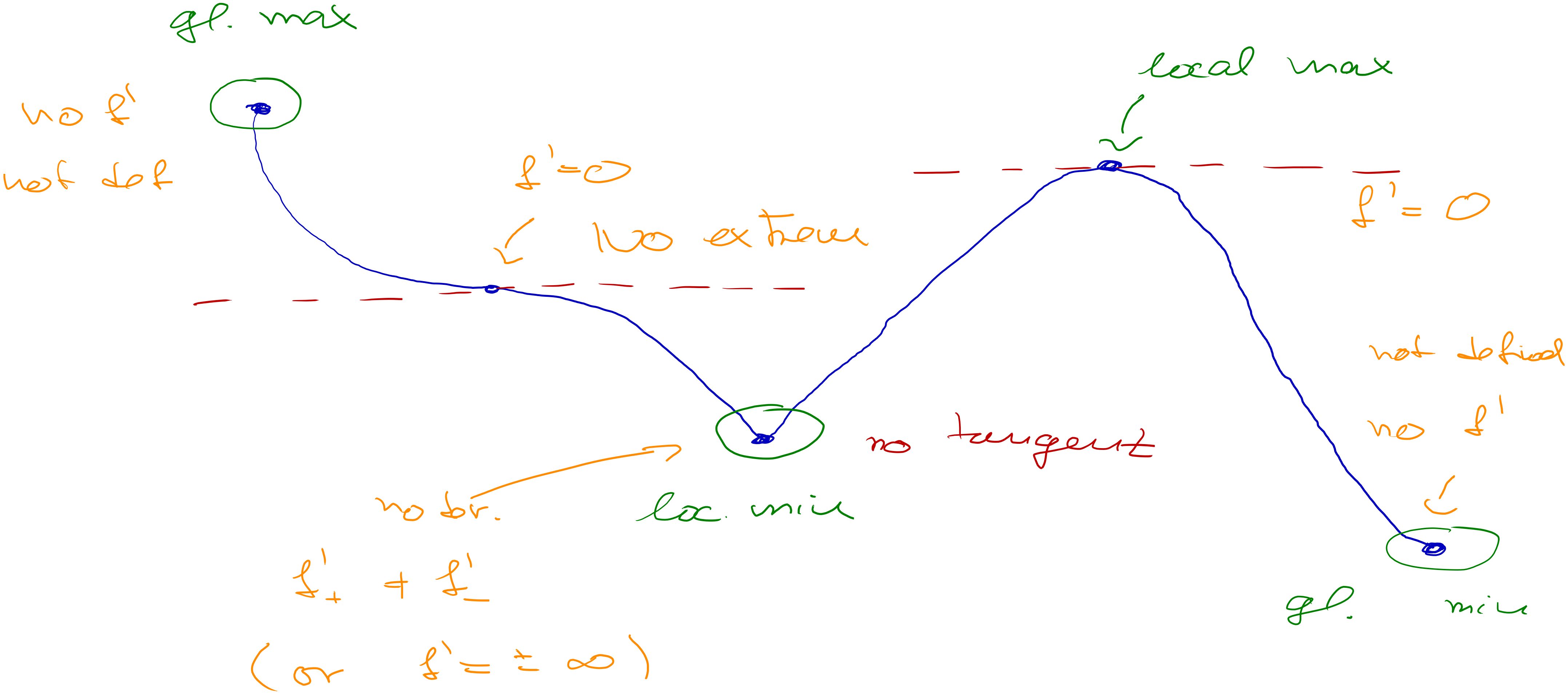
↘ ↗ lo. min

concl. f is decreasing on $(-\infty, 0)$, $(0, 1)$

increasing $(1, \infty)$

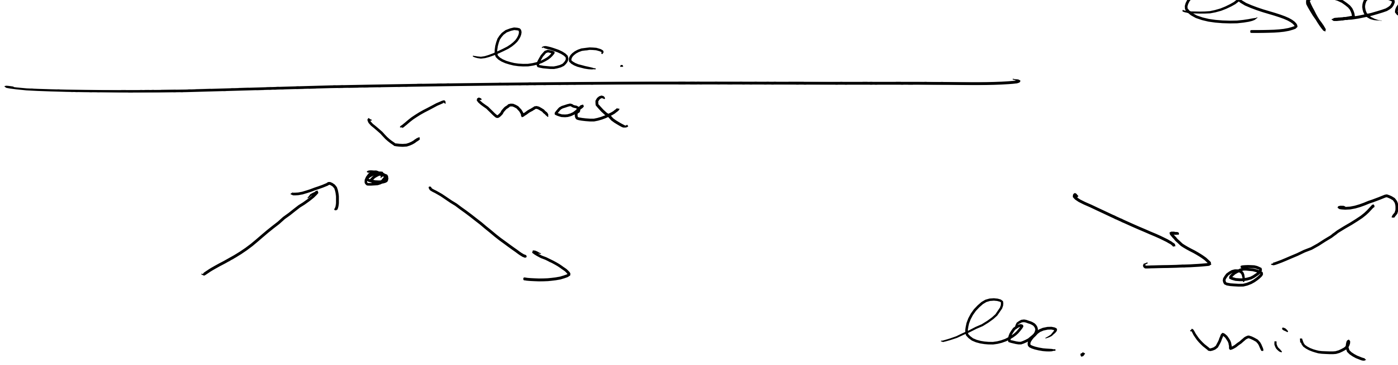


glob. min at $x_2 = 1$

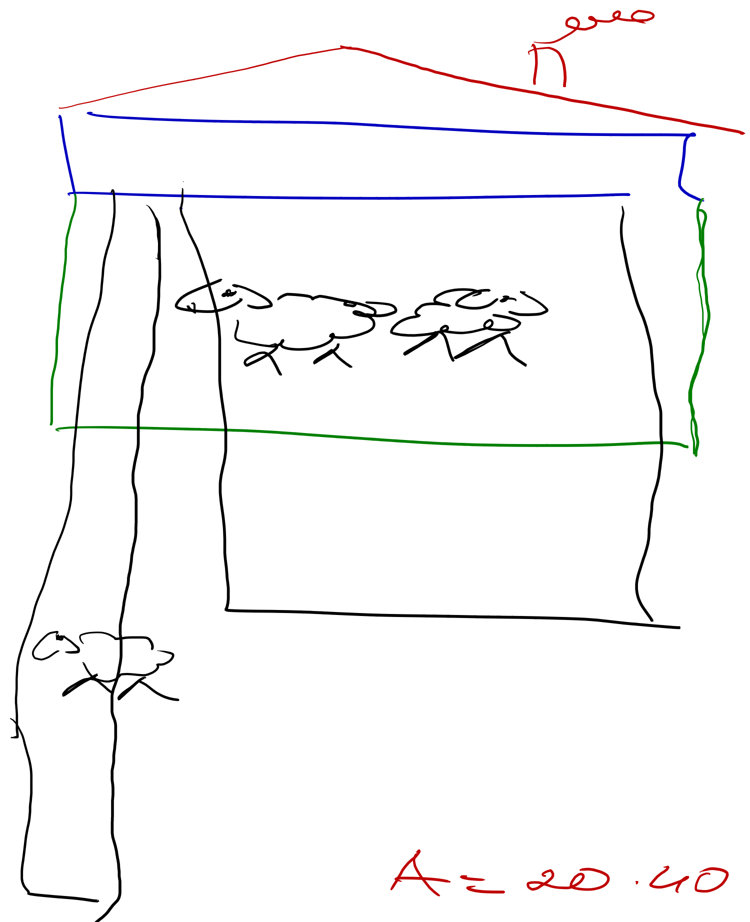


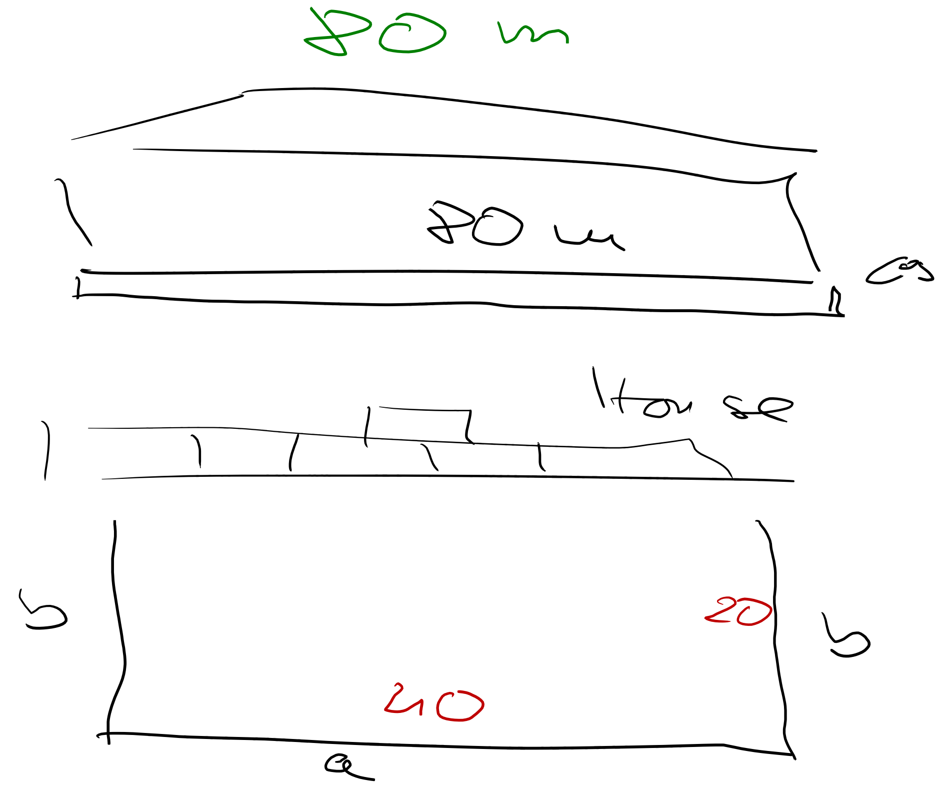
Local/Glob. Extrema CAN be at pt.:

- $f' = 0$
- f' does not exists
- espec. ends of intervals



$$([fg]h)' = \underbrace{[fg]'}_{f'g \; + \; fg'} h + fg\,h' = f'gh + fg'h + fgh'$$





$A = 20 \cdot 40$

$A = 800\ m^2$:)

$A = a \cdot b \qquad 80 = a + 2b$

$a = 80 - 2b$

$a = 80 - 2 \cdot 20 = 40$

$A(b) = (80-2b)b = 80b - 2b^2$

large

$A'(b) = 80 - 4b$

$80 - 4b = 0 \qquad \boxed{b = 20}$

$80 = 4b$

$20 = b$

b			
A'	+	0	−
A	↗	max	↘