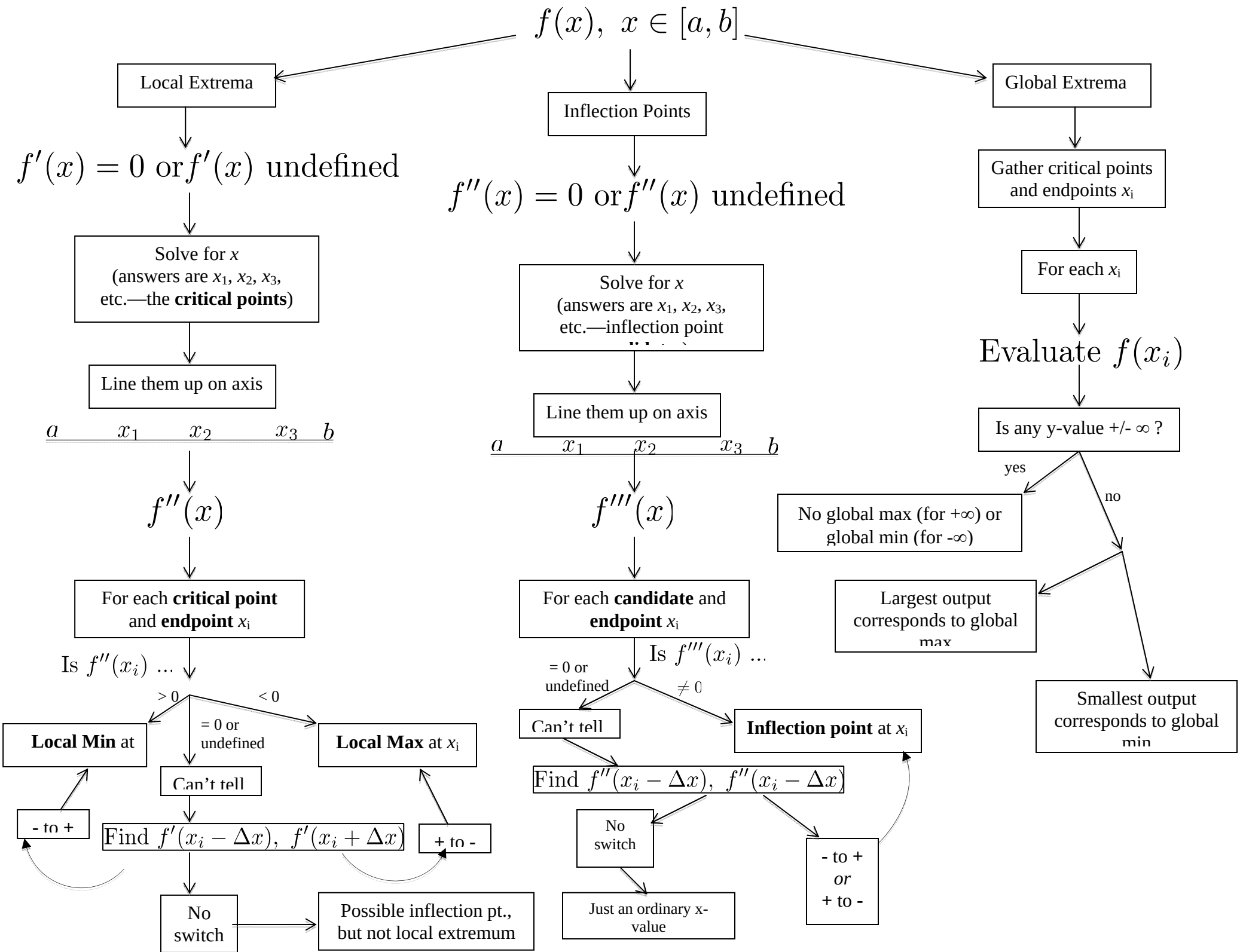
$f(x),\ x \in [a,b]$
Local Extrema
Inflection Points
Global Extrema
$f'(x) = 0$ or $f'(x)$ undefined
Solve for x (answers are x_1, x_2, x_3, etc.—the **critical points**)
Line them up on axis
a x_1 x_2 x_3 b
$f''(x)$
For each **critical point** and **endpoint** x_i
Is $f''(x_i)$ ...
> 0
< 0
= 0 or undefined
Local Min at
Local Max at x_i
Can't tell
- to +
+ to -
Find $f'(x_i - \Delta x),\ f'(x_i + \Delta x)$
No switch
Possible inflection pt., but not local extremum
$f''(x) = 0$ or $f''(x)$ undefined
Solve for x (answers are x_1, x_2, x_3, etc.—inflection point
Line them up on axis
a x_1 x_2 x_3 b
$f'''(x)$
For each **candidate** and **endpoint** x_i
Is $f'''(x_i)$ ...
= 0 or undefined
$\neq 0$
Can't tell
Inflection point at x_i
Find $f''(x_i - \Delta x),\ f''(x_i - \Delta x)$
No switch
Just an ordinary x-value
- to + *or* + to -
Gather critical points and endpoints x_i
For each x_i
Evaluate $f(x_i)$
Is any y-value +/- ∞ ?
yes
no
No global max (for +∞) or global min (for -∞)
Largest output corresponds to global max
Smallest output corresponds to global min