Critical point: $f'(x_0)=0$

- local maximum
- local minimum
- saddle

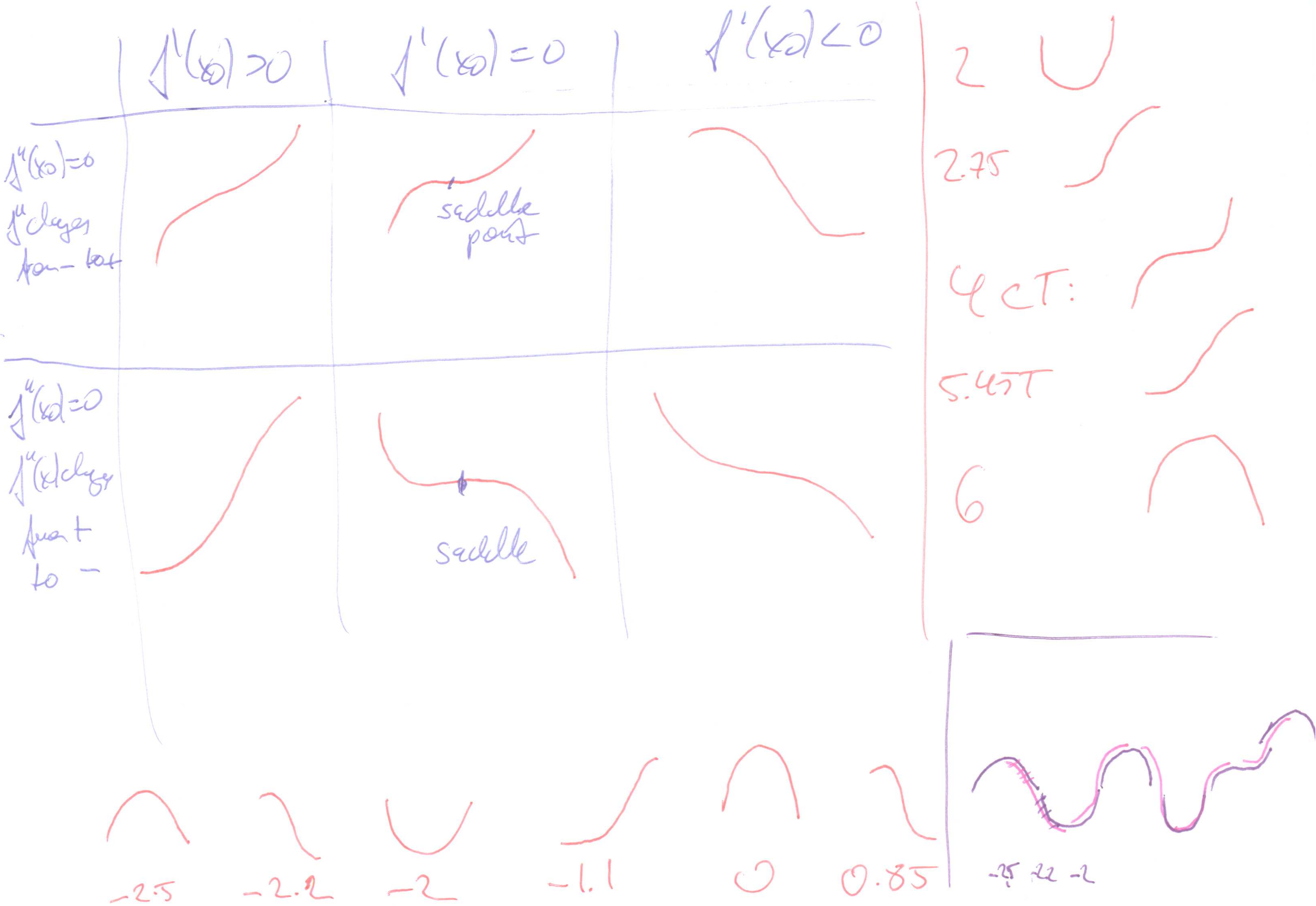
Turning point $f''(x_0)=0$

Table VI.1 Notes

1	2	3	4	5	6
-10	-18	-13	7	17	32
7	8	9	10	11	12
31	6	-1	29	34	3

crit. pt.

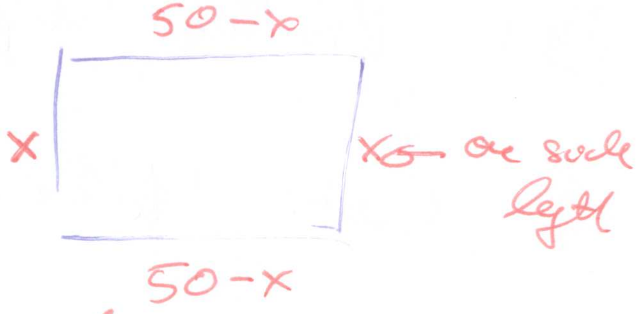
	$f'(x_0)>0$	$f'(x_0)=0$	$f'(x_0)<0$
$f''(x_0)<0$		local max.	
$f''(x_0)>0$		local min	
$f''(x_0)$ (turning point) | $f''(x)=0$ constant			



f'(x0)>0
f'(x0)=0
f'(x0)<0
f''(x0)=0
f'' changes
from - to +
saddle
point
f''(x0)=0
f''(x) changes
from +
to -
saddle
2
2.75
4 CT:
5.457
6
-2.5
-2.2
-2
-1.1
0
0.85
-2.5 -2.2 -2

Ex: Fence: 100 units

Fence in maximal rectangular area



For which value of x is area maximal.

Area: $f(x) = x(50-x) = 50x - x^2$

! For maximum

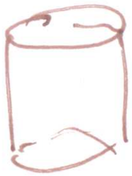
Derivative: $f'(x) = 50 - 2x \overset{!}{=} 0$

$\Rightarrow$ solve $x = 25$

$f''(x) = -2 < 0 \Rightarrow$ maximum

$\Rightarrow$ Area is maximal for $x = 25$

(square)



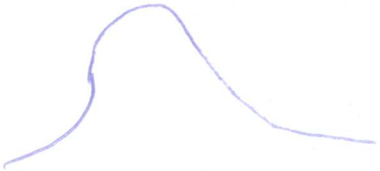
Ex: Produce Widgets . Ingredient: Magic Dust.

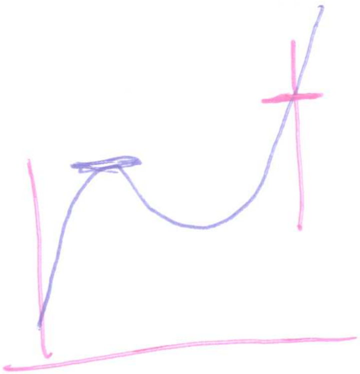
Cost: If there are x units of magic dust, cost is $x^3-50x^2+700x-1000$

$5 \le x \le 50$ For which value of x is this min.

Derivative: $3x^2-50x+700 = (x-10)(3x-70)$

Crit. pts: 10, $70/3 = 23.33$





	5	10	22.3	50
$f(x)$	1375	2000	814.81	34000

local min

global min