

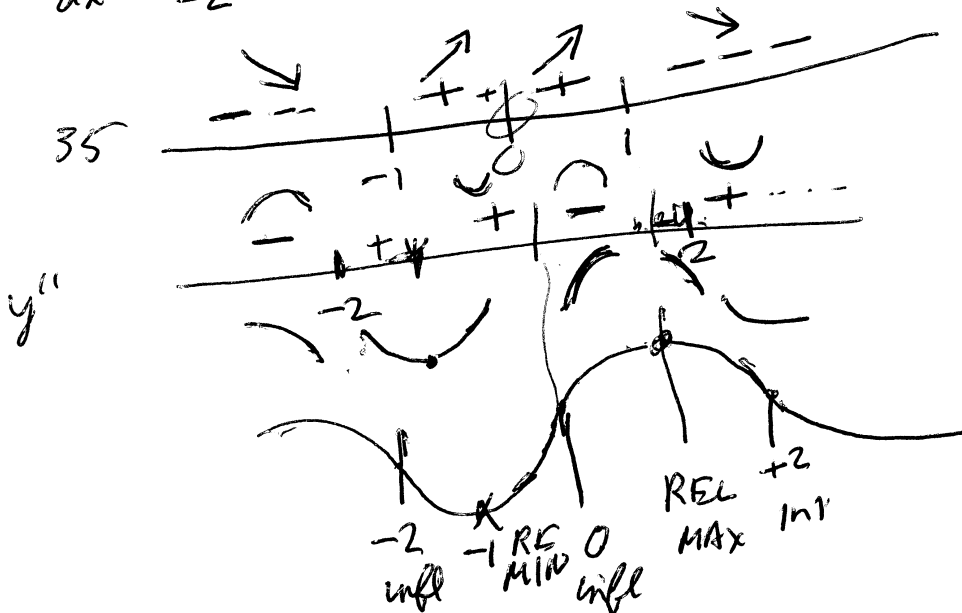
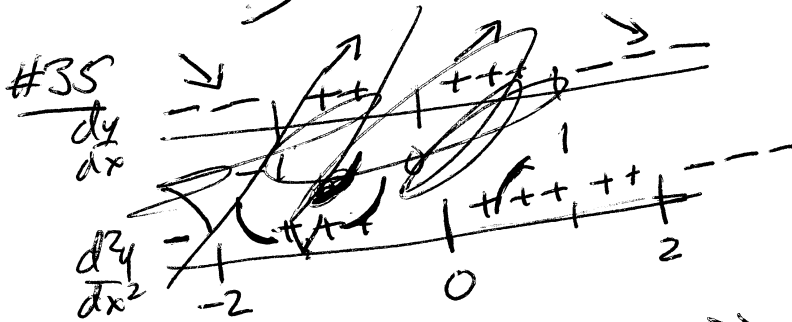
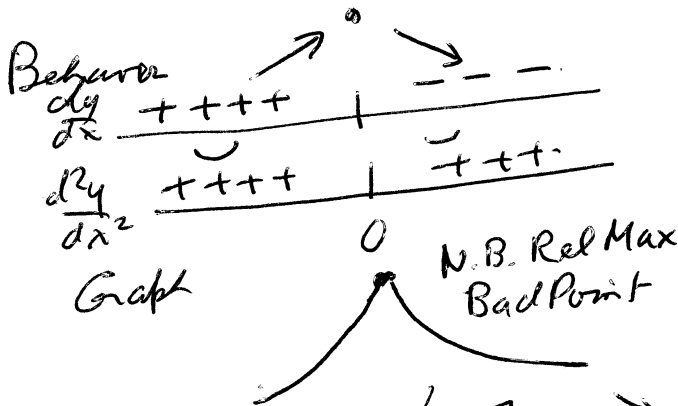
Functions [nice on an interval]

Relative extrema:  $\frac{dy}{dx} = 0$

Critical Nos  $\equiv$  solutions of  $\frac{dy}{dx} = 0$

3.3 Find: CR NOS (and for values)  
2nd Deriv (and possible inflection)

3.3.33



Need Values to know what

#843  $y = \frac{Ax-3}{5+Bx}$  ;  $x=2$  vertical ( $\div 0$ )  
 $v=4$  horiza

①  $5+B \cdot 2 = 0$  ,  $B = -2.5$

As  $x \rightarrow +\infty$   $y \approx \frac{A}{B} = 4$   $A = 4B = -10$

Vertical and Horizontal Asymptotes

⑬  $f(t) = \frac{t^2+3t-5}{t^2-5t+6}$

Vertical: where  $\div 0$  (if  $\text{den} \neq 0$  also)

$t^2-5t+6 = (t-3)(t-2)$

Vertical asympt at  $t=2, t=3$ .

Horizontal asymptote  $C$

mean  $\lim_{t \rightarrow +(-)\infty} y = C$

Here  $y = \frac{t^2+3t-5}{t^2-5t+6} \approx \frac{t^2 + \text{much smaller} \approx 1}{t^2 + \text{much smaller}}$  as  $t \rightarrow \pm\infty$

SPECIAL CR.NOS.

Rel Extrema: MAX 

char by (1) first derivative goes + to -  
 (2)  $y'' < 0$  [ $y'' = 0$  not used]

min (1)  
 (2)

(1) first der goes + to +  
 (2)  $y'' = 0$  possible inflection likely MIN

(1) first der goes - to -

Checking values on both sides  
 "near"  $\equiv$  avoid other crit no



ABSOLUTE MAX MIN EXTREMA on an interval 2009 0220 3/

$f(x)$  is ABS MAX of  $f$  on  $I$  at  $c$  if  $f(c) \geq f(x)$  for all  $x$  in  $I$

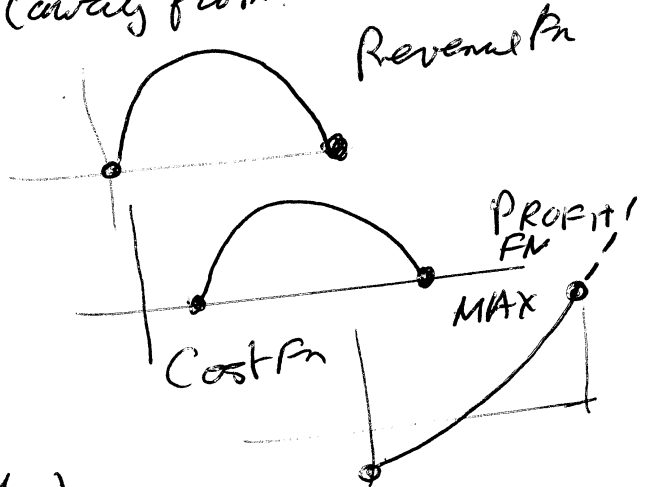
LOOK { SPECIAL (often cut out by looking only at  $I$ )  
 Critical numbers (away from end)  
 End Points

First examples CLOSED (including end points!)

p. 236 Extreme Value Property  
 $f \rightarrow$  Continuous on  $[a, b]$

$f$  Has extrema - located at { CR NO inside (open)

{ END [see special in the sense that you "changed the rules" refusing to go beyond  $b$ .]



10 a no

Ex. 3.4.1 ABS MIN/MAX on  $[-3, 0]$

$$f(x) = 2x^3 + 3x^2 - 12x - 7$$

Blind algebra

$$\begin{aligned} \frac{dy}{dx} &= 6x^2 + 6x - 12 \quad \text{[looks factorable]} \\ &= \cancel{6(x^2 + x - 2)} \\ &= 6(x^2 + x - 2) = 6(x+2)(x-1) \end{aligned}$$

$x = -2$  inside,  $x = 1$  outside

Check  $f(-3) = 2$   
end  $f(-2) = 13$   
 $f(0) = -7$

Calculator

RelMAX by checking values

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PICTURE



Zeemans