ection 4.2 – Max, mins, critical numbers

ns:

absolute max – highest y-value of f
absolute min – lowest y-value of f

local max – highest around a point (c)
local min – lowest around a point (c)

Maxima – plural of maximum
Minima – plural of minima

Extremum – a max or min
Extrema – plural of extremum

'Global' = Absolute
'Relative' = local

Critical Number
$f'(c)=0$ $f'(c)=$ und

Theorum's:

- Extreme Value Theorum (EVT)
  - if f is continuous on a closed interval [a, b], than f obtains an absolute max $f(c)$ and min $f(d)$
- Fermat's Theorum
  - if f has a local extrema at c, and $f'(c)$ exists, then $f'(c)=0$

Steps to solve this type of problem

1 – continuous?
2 – find critical values – in domain?
3 – evaluate origional function at endpoints & critical values
4 – which is biggest? – max
5 – which is smallest? – min

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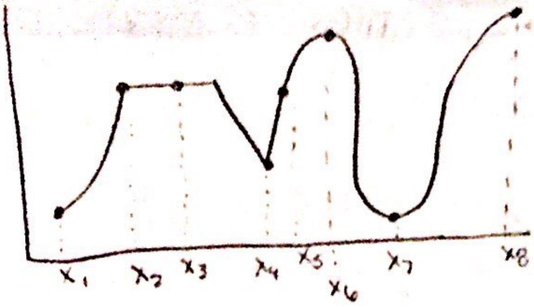

x_1 = LMin
x_2 = LMX
x_3 = N / LMX
x_4 = LMn
x_5 = N
x_6 = LMX
x_7 = AMin
x_8 = AmX

— absolute min or max, local min or max, neither?

(14) Find critical #'s

- $f(x) = 1-6x+x^2$ $f'(x) = 2x-6$
  $f'(0)$ @ $x = 3$
  $f'(c)$ = und – N/A

- $f(x) x^3 - 6x$ $f'(x) = 3x^2 - 6$ $3x^2-6=0$
  $3x^2 = 6$
  $x^2 = 18$
  $x = \pm\sqrt{18}$

- $x^{1/3}$ $f'(x) = \frac{1}{3}\frac{1}{x^{2/3}}$ $x=0$

- $4-\sqrt{x}$ $f'(x) = -\frac{1}{2}x^{-1/2} = -\frac{1}{2\sqrt{x}}$ $x=0$

- $\frac{x}{x^2-1}$ $f'(x) = \frac{(x^2-1)-x(2x)}{(x^2-1)^2} = \frac{-x^2-1}{x^4-2x^2+1}$ $x = 1$ $x = -1$
  $(x^2-1)(x^2-1) = x^4-2x^2+1$

$f(x) = x^2-8x$ $[-1, 10]$ $f'(x) = 2x-8$ $x = 4$

$x=-1 \rightarrow 9$
$x = 4 \rightarrow 16-32 = -16 \rightarrow$ min
$x = 10 \rightarrow 10^2 - 8x = 20 \rightarrow$ Max

$x) = 1-6x+x^2$ $[0,4]$ $f'(x) = 2x-6$ $x = 3$

$= 0 \rightarrow 1 \longrightarrow$ max
$= 3 \rightarrow 1-6(3)+(3)^2 = 1-18+9 = -8$
$= 4 \rightarrow 1-6(4)+(4)^2 = 1-64+16 = -64+17 = -47 \rightarrow$ min

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