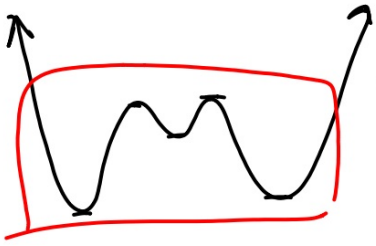
Trig 3.6

$f(x) \to \infty$ if $x \to -\infty$

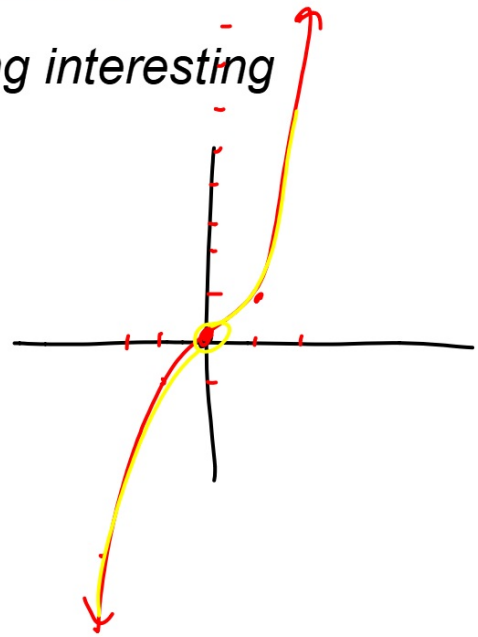


$f(x) \to \infty$ if $x \to \infty$

Find the extrema of a function

maxs + mins

critical point (value, numbers) *something interesting*



maximum (absolute, relative)

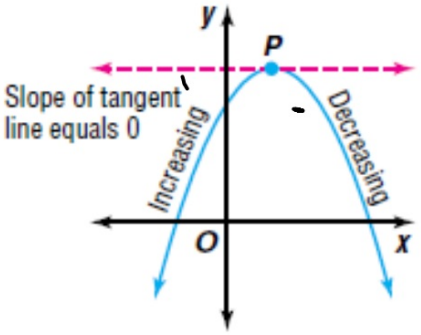
minimum (absolute, relative)

inflection point slope changes

extrema (extremum): all max, min,
inflection points (only if they ask)

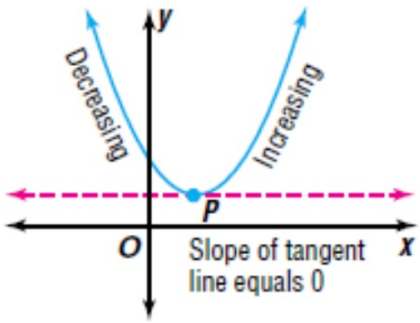
activity: graphing calculators/ trace/ table

spaghetti follows curve



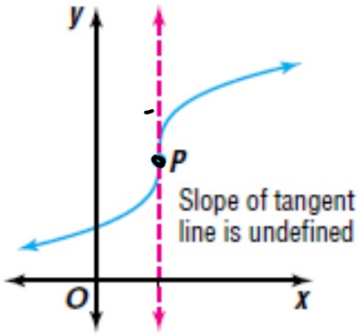
Maximum at *P*

incr – 0 – decr.



Minimum at *P*

decr – 0 – incr.

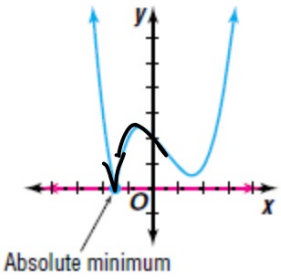


Point of inflection at *P*

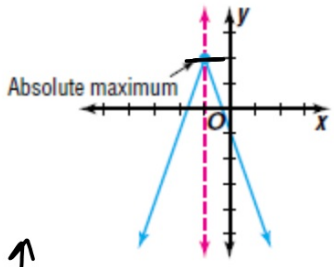
increas – ⌢ – incr.

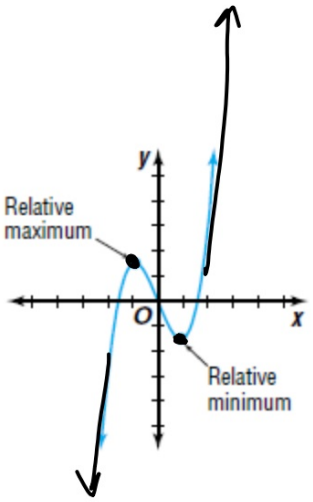
decr ⌢ decr

Where does slope change?


y
O
x
Absolute minimum

Cusp


y
Absolute maximum
O
x


y
Relative
maximum
O
x
Relative
minimum

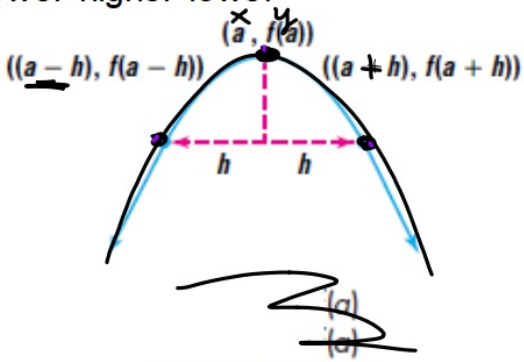
Don't overthink this...
Mountaintops
Valleys
Other

p. 174

Critical Points

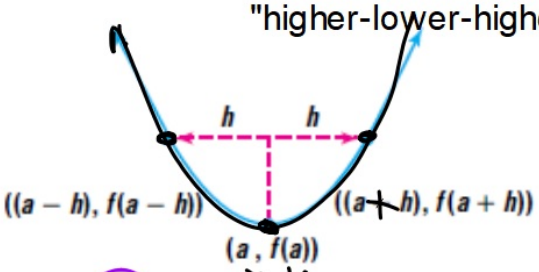
For $f(x)$ with $(a, f(a))$ as a critical point and h as a small value greater than zero

"lower-higher-lower"



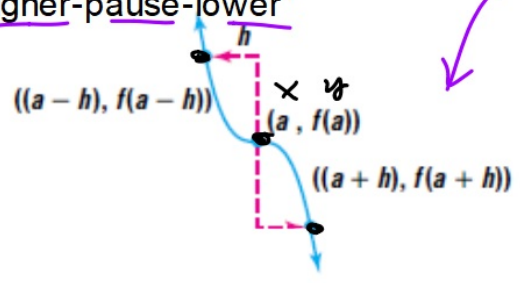
$f(a)$ is a maximum.

"higher-lower-higher"



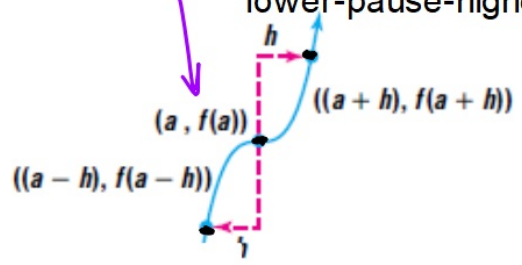
$f(a)$ is a minimum.

"higher-pause-lower"



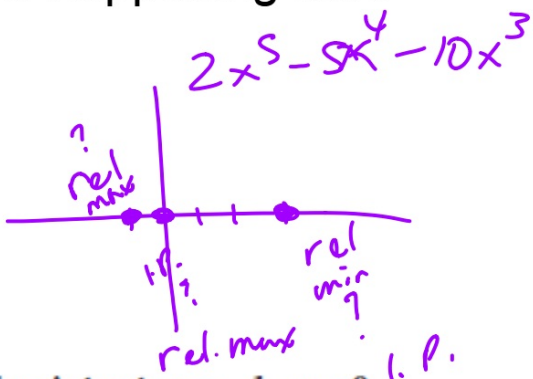
$f(a - h) > f(a)$
$f(a + h) < f(a)$
$f(a)$ is a point of inflection.

"lower-pause-higher"



$f(a - h) < f(a)$
$f(a + h) > f(a)$
$f(a)$ is a point of inflection.

Critical point: something interesting is happening here at x= *whatever.*
What is it?
Estimate (graph) by eyeball
Prove it! (table) look at y-coords.



3 The function $f(x) = 2x^5 - 5x^4 - 10x^3$ has critical points at $x = -1$, $x = 0$, and $x = 3$. Determine whether each of these critical points is the location of a maximum, a minimum, or a point of inflection.

rel. min