CALCULUS I
Extrema Notes

Extreme Function Values

**Maximum** - The largest function value on some interval (the highest point on the graph)

Minimum - The smallest function value on some interval (the lowest point on the graph)

Critical Values - Values of x at which $F'(x) = 0$ or is undefined

Critical Points - The ordered pairs associated with critical values

Relative or Local Extrema

They are always critical points, but not all critical points are locations of extreme function values. In order for a critical point to be a relative extreme there must be a sign change in the derivative around the critical value.
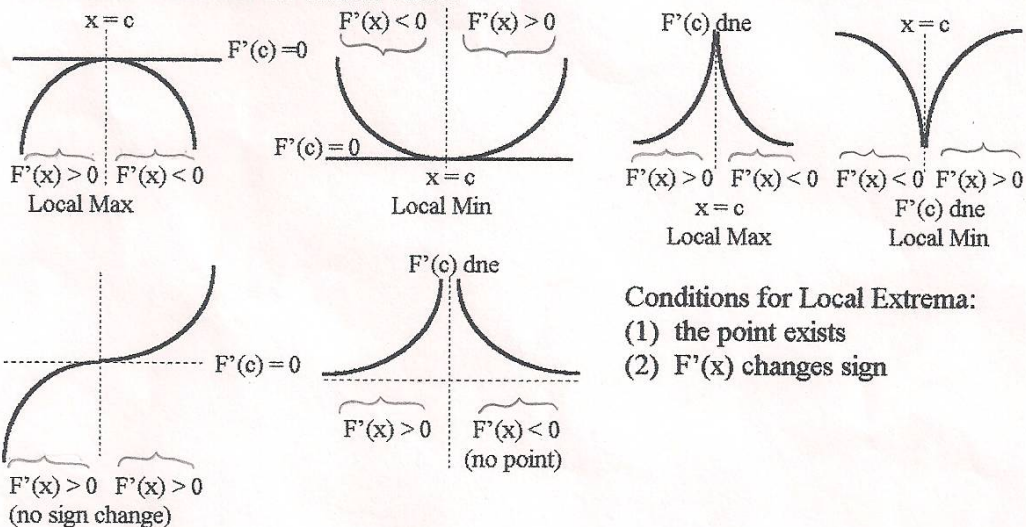
Conditions for Local Extrema:
(1) the point exists
(2) F'(x) changes sign

Absolute or Global Extrema

Occur at the endpoints of [a, b] or at critical points in (a, b). To find absolute extrema evaluate included endpoints $f(a)$ and/or $f(b)$, and also find $f(c)$ for any critical value c in (a, b). The following guarantees of absolute extrema are given:

1) If the interval is closed there will be both an absolute max and an absolute min. For open or half-open intervals there is no such guarantee.

2) If there is only one relative extremum on (a, b), then this will be the absolute extreme on (a, b).