

Here  $f$  is a function &  $I$  is an interval.

$\left\{ \begin{array}{l} f \text{ continuous on } I \\ \& f' > 0 \text{ on interior of } I \end{array} \right\} \Rightarrow f \text{ is (increasing) on } I$   
 $\left\{ \begin{array}{l} f \text{ continuous on } I \\ \& f' < 0 \text{ on interior of } I \end{array} \right\} \Rightarrow f \text{ is (decreasing) on } I$

$\left\{ \begin{array}{l} f \text{ cts. on } I \\ \& f'' > 0 \text{ on interior of } I \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} f \text{ cts. on } I \\ \& f' \nearrow \text{ on interior of } I \end{array} \right\} \Rightarrow f \text{ is (concave up) on } I$

$\left\{ \begin{array}{l} f \text{ cts. on } I \\ \& f'' < 0 \text{ on interior of } I \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} f \text{ cts. on } I \\ \& f' \searrow \text{ on interior of } I \end{array} \right\} \Rightarrow f \text{ is (concave down) on } I$