

Reference 6: Derivative Relationships

Derivative Relationships on an interval (a, b)

	f is positive on (a, b)	→	f is increasing on (a, b)
	f is negative on (a, b)	→	f is decreasing on (a, b)
	f' is zero on (a, b)	↔	f is constant on (a, b)
f'' is positive on (a, b)	→	↔	f is concave up on (a, b)
f'' is negative on (a, b)	→	↔	f is concave down on (a, b)
f'' is zero on (a, b)	↔	↔	f is a straight line on (a, b)

Derivative Relationships at a particular $x = c$

	f' is positive at $x = c$	↔	The line tangent to the graph of f at $x = c$ slopes upward.
	f' is negative at $x = c$	↔	The line tangent to the graph of f at $x = c$ slopes downward.
	f' is zero at $x = c$	↔	The line tangent to the graph of f at $x = c$ is horizontal.
f'' is positive at $x = c$	↔	↔	f is concave up at $x = c$
f'' is negative at $x = c$	↔	↔	f is concave down at $x = c$
f'' is zero at $x = c$	↔	↔	The line tangent to the graph of f' at $x = c$ is horizontal.