4.2 Inflection points

Definition. For a function $f(x)$, an **inflection point** is a number $x = c$ such that $f(x)$ changes concavity at $x = c$.

We find inflection points the same we way find local max/mins: (1) take the second derivative, (2) set it equal to 0, (3) solve this equation, (4) confirm your answers by looking at the graph.

4.3 Global max and min

Definition. Let $x = c$ be in the domain of $f(x)$.

$x = c$ is a global maximum	if $f(x) \leq f(c)$ for all x in the domain of $f(x)$. (we allow endpoints)
$x = c$ is a global minimum	if $f(x) \geq f(c)$ for all x in the domain of $f(x)$. (we allow endpoints)

"Global" max/mins are also sometimes called "absolute" max/mins.

Theorem 1 (Global max/min test (aka "closed interval method")). To find the absolute max/min of a function $f(x)$ on an interval $[a, b]$, do the following.

1. Find the critical points of $f(x)$ in the interval $[a, b]$.
2. Calculate the y-value of $f(x)$ at each critical point.
3. Calculate the y-value of $f(x)$ at each endpoint.
4. The absolute max value is the biggest y-value from steps 2 and 3. The absolute min value is the smallest y-value from steps 2 and 3.

4.4 Optimizing Cost and Revenue

In this section we apply some of what we've learned for max/mins to topics from economics and business: cost, revenue and profit.

Recall that $\pi(q)$ is the profit function, and that $\pi(q) = R(q) - C(q)$.

- If $MC = MR$ then $\pi'(q) = 0$ and so π is at a critical point (*maybe* maximum)
- If $MR > MC$ then $\pi'(q) > 0$ and so increasing q will increase π.
- If $MR < MC$ then $\pi'(q) < 0$ and so increasing q will decrease π.